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Health, Safety and Reclamation Code for Mines in British Columbia

Resource Management Branch
Ministry of Energy, Mines
and Petroleum Resources

Victoria, British Columbia

Honourable Anne Edwards, Minister

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MESSAGE FROM THE MINISTER

The publication of British Columbia's new Health, Safety and Reclamation Code in June 1990 was the culmination of more than two years of dedicated and cooperative efforts from labour, industry and government mines inspectors.

The new code reflected a recognition of change in three important areas: conditions in our province's mining industry; society's expectations for full environmental protection and permanent mine reclamation; and the need for worker participation in ensuring safe, healthy and environmentally sound mining operations.

The *Mines Act* requires that the code be subject to an annual review. Therefore, almost as soon as the 1990 code was published, the review began under the auspices of the Health, Safety and Reclamation Code Review Committee.

The result is contained in this volume. The desire of the review committee to meet the practical needs of users has been extended through the new and greatly improved index which provides easy access to all sections by means of key words and specific topic references.

It is a tribute to the thorough work performed by the tripartite committee in its initial code review in 1989 and 1990 that the remaining changes are relatively minor additions and clarifications. It is also a tribute to the tripartite process that occupational health and safety professionals in other provinces and jurisdictions are adopting consultative procedures modelled on those used for this code.

I wish to express my thanks to the members of the review committee, whose names and affiliations are given on the following pages, for their valuable contribution to the safest heavy industry in this province.

Anne Edwards.

Honourable Anne Edwards
Minister

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MINISTER OF ENERGY, MINES AND PETROLEUM RESOURCES

BILL 56 — JUNE 1990

MINES ACT

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HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of British Columbia, enacts as follows:

Interpretation

1. In this *Act*

"*abandoned mine*" means a mine for which all permit obligations under this *Act* have been satisfied and in respect of which the mineral claims have reverted to the Crown.

"*agent*" means a person having control of a mine on behalf of the owner.

"*authorized person*" means a qualified person appointed or designated by the manager to perform specified duties.

"*chief inspector*" means the Chief Inspector of Mines appointed by the minister and includes a person designated by the chief inspector to act on his behalf.

"*closed mine*" means a mine at which all mining activities have ceased but in respect of which the owner, agent, or manager remains responsible for its compliance with this *Act*, the regulations, and the code.

"*code*" means the health, safety, and reclamation code established under this *Act*.

"*district inspector*" means a person appointed by the chief inspector as an inspector with responsibility for a designated area within the Province.

"*inspector*" means a person appointed by the chief inspector as an inspector of mines.

"*local union*" means a union certified under the *Industrial Relations Act* as the bargaining agent for employees or a unit of employees at a mine.

"*manager*" means the person appointed under section 21 to be responsible for the management and operation of a mine.

"*management*" means employees of a mine who act as supervisors.

"*management co-chairperson*" means the co-chairperson chosen for the occupational health and safety committee by the manager.

"*mine*" includes

(a) a place where mechanical disturbance of the ground or any excavation is made to explore for or to produce coal, mineral bearing substances, placer minerals, rock, limestone, earth, clay, sand, or gravel,

(b) all cleared areas, machinery and equipment for use in servicing a mine or for use in connection with a mine and buildings other than bunkhouses, cook houses, and related residential facilities,

(c) all activities including exploratory drilling, excavation, processing, concentrating, waste disposal, and site reclamation,

(d) closed and abandoned mines, and

(e) a place designated by the chief inspector as a mine.

"*occupational health and safety committee*" means the joint worker management committee established for each mine under this *Act*.

"*owner*" includes every person who is the immediate holder, proprietor, lessee, or occupier of a mine or of any part of it, but does not include a person who

(a) receives only a royalty or rent from a mine that is subject to a lease, grant, or other authority for its working, or

(b) is the owner of the surface rights of land in, on or under which a mine exists but who is not the owner of the coal or minerals in it.

"*qualified person*" means a person who, in the opinion of the manager, is

(a) qualified because of his knowledge, training, and experience to design, organize, supervise, and perform the duties for which he is appointed,

(b) familiar with the provisions of this *Act*, the regulations, and the code that apply to the duties for which he is appointed, and

(c) capable of identifying any potential or actual danger to health or safety in the workplace.

"*supervisor*" means a person who instructs, directs or controls workers in the performance of their duties and who is authorized by the manager to take or recommend disciplinary action against workers.

"*worker*" means a person who is an employee but does not include a supervisor.

"*worker co-chairperson*" means the co-chairperson chosen for the occupational, health, and safety committee by the workers.

"*workplace*" means a place where work is carried out in, on, or about a mine.

Application

2. This *Act* applies to all mines during exploration, development, construction, production, closure, reclamation, and abandonment.

Chief Inspector

3. The minister shall designate in writing a person appointed under the *Public Service Act*, as the Chief Inspector of Mines.

Authority

4. The chief inspector has the rights and powers conferred on an inspector under this *Act*.

Power to Appoint Inspectors

5. The chief inspector may appoint persons as inspectors for the purposes of this *Act*.

Delegation of Powers

6. The chief inspector may delegate in writing to an inspector any of the powers conferred on him under this *Act*.

Accident Investigations

7. An inspector may, and on the direction of the chief inspector shall, make an investigation of and report about an accident that has caused serious personal injury, loss of life or property, or environmental damage.

Powers of Commissioner Under *Inquiry Act*

8. An inspector conducting an investigation under section 7 has the protection, privileges, and powers of a commissioner under sections 12, 15 and 16 of the *Inquiry Act*.

Advisory Committee

9. The chief inspector shall establish and chair an advisory committee and shall establish regional advisory committees to review applications for mine approvals and reclamation permits, referred to them by the chief inspector, to assist him in carrying out his duties under this *Act*.

Permits

10. (1) Before commencement of any work in, on, or about a mine, the owner, agent, or manager shall apply for and obtain a permit from the chief inspector and shall, as part of the application, file with the district inspector a plan outlining the details of the proposed work and a program for the protection and reclamation of the land and watercourses affected by the mine, including the information, particulars, and maps established by the regulations or the code.

(2) Notwithstanding subsection (1), where the chief inspector is satisfied that, because of the nature of the proposed work, it is not necessary to obtain a permit, he may exempt in writing the owner, agent, or manager from the requirement to comply with this section with respect to the proposed work.

(3) Where the chief inspector considers the application for a permit is satisfactory he may issue the permit, and the permit may contain conditions that the chief inspector considers necessary.

(4) The chief inspector may, as a condition of issuing a permit under subsection (3), require that the owner, agent, or manager give security in the amount, form, and subject to conditions specified by the chief inspector

(a) for mine reclamation, and

(b) to provide for protection of, and mitigation of damage to, watercourses affected by the mine.

(5) Where required by the chief inspector, the owner, agent, or manager shall, in each year, deposit security in an amount and form satisfactory to the chief inspector so that, together with the deposit under subsection (4) and calculated over the estimated life of the mine, there will be money necessary to perform and carry out properly

(a) all the conditions of the permit relating to the matters referred to in subsection (4) at the proper time, and

(b) all the orders and directions of the chief inspector or an inspector respecting the fulfillment of the conditions relating to the matters referred to in subsection (4).

(6) The owner, agent, or manager, or an inspector, may apply to the chief inspector for a revision of the conditions or an extension of the term of a permit issued under this section, and the chief inspector may revise the conditions or extend the term, as the case may be, and, where he considers it necessary, the chief inspector may impose additional conditions or changes in the existing conditions, including changes to the security required or the term of the permit, with or without an application under this section.

(7) Where the owner, agent, or manager fails to perform and complete the program for reclamation or comply with the conditions of the permit to the satisfaction of the chief inspector, the chief inspector, after giving notice to remedy the failure, may

(a) cancel the permit and order the owner, agent, or manager to stop the mining operation, and

(b) apply all or part of the security toward payment of the cost of the work required to be performed or completed.

(8) The manager shall maintain a valid and subsisting permit and no work shall take place in, on, or about a mine without one.

Permits — Power of Minister

11. Where the minister considers it to be necessary in the public interest, he shall have and may exercise, in respect of the issuing of permits, all the powers that the chief inspector may exercise under this *Act*.

Mine Reclamation Fund

12. (1) In this section "fund" means the mine reclamation fund.

(2) The Lieutenant Governor in Council may, by regulation, establish a fund to be known as the mine reclamation fund into which shall be paid security, that is in the form of money, given by the owner, agent, or manager of a mine under section 10.

(3) Money received from an owner, agent, or manager shall be credited to a separate account in the fund in the name of the mine.

(4) The minister may requisition payments from an account in the fund to

(a) refund money and interest earned on it to the owner, agent, or manager of a mine, from time to time, when in the opinion of the chief inspector it is no longer required for mine reclamation and protection of, and mitigation of damage to, the land and watercourses affected by the mine, or

(b) pay for the cost of work required under section 10 (7) (b).

Variance

13. (1) The chief inspector may, on receiving a written application from the manager, the occupational health and safety committee, or the local union requesting the suspension or variance of a provision of the regulations or of the code, suspend or vary the provision if he is of the opinion that the provision does not operate in the best interest of, or is not necessary to, health and safety in an individual mine.

(2) The chief inspector shall ensure that the parties affected by the application are advised of the application for, and the subsequent decision respecting, a variance.

(3) The chief inspector shall maintain a register of all variances and, at least once every 5 years, shall review each variance and advise the manager, occupational health and safety committee, and local union that he intends to review the variance and, after reviewing any submissions, shall advise them whether or not the variance is to be continued.

Discrimination

14. (1) Each manager shall ensure that no employee is discriminated against in any manner, including adversely affecting any term or condition of employment, for complying with this *Act*, the regulations, or the code.

(2) Where advised in writing of an alleged case of discrimination against an employee for complying with this *Act*, the regulations, or the code, or refusing to work because it would result in a contravention of this *Act*, the regulations, or the code, the chief inspector shall make an investigation and report his findings to the manager and occupational health and safety committee, and the local union, if any.

(3) Where the chief inspector is satisfied that the allegation is true, he may make one or more orders requiring the employer to do one or more of the following:

(a) cease the discrimination;
(b) hire or reinstate the employee;
(c) pay him any wages lost by reason of the discrimination;
(d) pay the employee reasonable and actual out of pocket expenses incurred by him by reason of the discrimination.

Inspections

15. (1) An inspector may inspect a mine at any time.

(2) An inspector shall, where he is making a health and safety inspection, on arrival at the mine, request the manager to arrange for the worker co-chairperson or designate and the management co-chairperson or designate, each to appoint a representative to accompany him on the inspection.

(3) Notwithstanding subsection (2), an inspector may perform the inspection without either or both management and worker representatives, but on completion of the inspection he shall meet with or otherwise communicate with each co-chairperson or their designate to discuss his findings and their occupational, health, and safety concerns, if any.

(4) An inspector shall complete his inspection report within 7 days and forthwith provide the manager, and, in the case of a health and safety inspection, the occupational health and safety committee and local union with a copy of his inspection report on its completion, and the report shall

(a) list the workplaces inspected,
(b) list the infractions noted, and
(c) order remedial action and specify time limits for compliance.

(5) Where an inspector is of the opinion that a delay in remedying a hazard would be dangerous to persons or property, he shall issue an order

(a) for immediate remedial action,
(b) to suspend regular work until remedial action is taken, or
(c) to close the mine or part of it until remedial action is taken.

(6) The manager shall, within 15 days after receiving the inspection report, submit a written report outlining the remedial steps taken and the work still outstanding and shall forthwith provide a copy to the district inspector and, in the case of health and safety matters, the occupational health and safety committee and the local union.

Order Not to Interfere With Public Works, etc.

16. An inspector may order the operation of a mine to be conducted in a manner that will not interfere with a public work, public service, public utility, highway or railway, or with a pipeline as defined in the *Pipeline Act* or an adjacent mine property.

Abandoned Mine

17. (1) Where an inspector is of the opinion that work may be necessary in, on, or about a closed or abandoned mine in order to avoid danger to persons or property or to abate pollution of the land and watercourses affected by the mine, he may enter on or below the surface of the mine and may cause work to be done to remove or alleviate the danger or remedy the pollution.

(2) The costs incurred for work done under this section shall be paid from the consolidated revenue fund without an appropriation other than this subsection.

(3) The amount expended plus interest at a prescribed rate is a debt due to the Crown and forms a lien and charge on the mine or mineral title in favour of the Crown.

(4) Notice of the debt in the prescribed form may be registered as a charge in the land title office or in the office of the chief gold commissioner, and no transfer of title or other dealing with the mine shall take place until the debt is paid and the notice cancelled.

(5) The minister may, with or without payment and on conditions he may impose, cancel the notice registered under subsection (4) and, on that happening, the mine may be transferred or otherwise dealt with.

Engineering Report

18. An inspector may order the owner, agent, or manager to provide at the owner's expense an independent study prepared by an engineer or other licensed professional acceptable to the inspector

(a) respecting health and safety at the mine or safety of its equipment, buildings, workings, or structures, or

(b) in connection with an accident or a dangerous occurrence that the inspector is investigating.

Immunities

19. (1) No action for damages because of anything done or omitted to be done in good faith

(a) in the performance or intended performance of any duty, or

(b) in the exercise or intended exercise of any power

under this *Act*, the regulations, or the code shall be brought against the chief inspector or an inspector.

(2) Subsection (1) does not absolve the Crown from vicarious liability for an act or omission of the chief inspector or an inspector for which act or omission the Crown would be vicariously liable if this section were not in force.

Designation Under Coroners Act

20. For the purpose of section 37 (1) of the *Coroners Act*, an inspector or a person designated by an inspector shall be deemed a person whose interests may be affected by evidence likely to be adduced at an inquest.

Appointment of Manager

21. An owner or agent shall

(a) before work commences, appoint a manager and ensure that there is a person acting in that capacity at all times,

(b) immediately after each appointment, notify the district inspector in writing, of the name of the manager, and

(c) provide the manager or his designate with every facility for conducting the operation of the mine in accordance with the requirementsof this *Act*, the regulations, and the code.

Manager's Qualifications and Responsibility

22. Each manager and designate shall possess qualifications established by the regulations or the code, and the manager or his designate shall attend daily at an operating mine.

Manager's Absence

23. Each manager shall appoint a qualified person to be responsible during his absence to ensure compliance with this *Act*, the regulations, and the code.

Compliance

24. The owner, agent, or manager shall take all reasonable measures to ensure compliance with this *Act*, orders issued under it, the regulations, and the code, and every supervisor and employee shall take all reasonable measures to ensure that the requirements of this *Act*, the regulations, the code, and orders applicable to the work they perform or over which they have supervision are followed.

Contractors

25. Where work in, on, or about a mine is let to a contractor, the contractor and the contractor's manager, as well as the owner, agent, and manager of the mine shall take all reasonable measures to ensure compliance with the provisions of this *Act*, the regulations, the code, and orders under this *Act* pertaining to the work over which they have control and, in a case of non-compliance, the contractor and the contractor's manager commit an offence that is punishable in the same manner as if the contractor and contractor's manager were the owner, agent, or manager of the mine.

Supervision Required

26. Each manager shall ensure that every person employed at a mine, where required by the regulations or the code, is under the daily supervision of a person who holds a valid and appropriate certificate as required by the regulations or the code.

Mine Plans

27. Each manager shall keep in the office at the mine site accurate plans that

(a) are updated every 3 months,

(b) are prepared on a scale that accords with good engineering practice,

(c) contain particulars established by the regulations or the code.

Employment Register

28. Each manager shall maintain, in a form prescribed by the chief inspector, a register of every person who is or has been employed at the mine and, when the mine is closed down or when required by the district inspector, shall forward a copy, certified by the manager to be a true copy, to the district inspector.

Alternative Employment

29. Where an inspector makes an order under section 15 (5) (b) or (c), the manager shall, if he is unable to provide alternate employment, pay or cause to be paid to each worker the amount that the worker would have earned or been likely to earn for each day the closure continues, up to a maximum of 3 working days.

Posting of Reports and Orders

30. (1) Each manager shall post in a conspicuous place at the mine all inspection reports and orders issued by an inspector and shall maintain them there for 30 days.

(2) Each manager shall ensure that all documents required to be posted are maintained in a legible condition.

Assistance to Inspectors

31. The owner, agent, manager, and all persons in, on, or about a mine shall provide an inspector with every facility necessary for the completion of an inspection or investigation.

Occupational Health and Safety Committee

32. Each manager shall ensure that an occupational health and safety committee is established in accordance with the regulations or the code, and the manager shall allow committee members to participate in inspections, investigations, and meetings of the committee under this *Act*, and such participation shall be considered as time worked.

Appeal to Chief Inspector

33. (1) A person who is adversely affected by a decision, order or ruling of an inspector may appeal the decision, order, or ruling in writing to the chief inspector within 30 days after the date of its issue.

(2) The manager, occupational health and safety committee, and local union shall be given an opportunity to make a submission on the matter of the appeal, receive copies of all submissions and be notified of the chief inspector's decision on the appeal.

(3) An appeal taken under this section does not operate as a stay or suspend the operation of the decision being appealed unless the chief inspector orders otherwise.

Regulations

34. (1) The Lieutenant Governor in Council may make regulations.

(2) Without limiting subsection (1), the Lieutenant Governor in Council may make regulations

(a) governing exploration, development, operation, closure, and abandonment of mines and mining property,

(b) respecting the type, application, use and operation of equipment, machinery and other property in, on, or about mines, whether movable or immovable or whether used in mining operations or not,

(c) relating directly or indirectly to the health and safety of all persons, including the public, in, on, or about mines, either underground or on the surface,

(d) respecting standards for environmental protection and reclamation,

(e) requiring management to give members of the occupational health and safety committee access to relevant records,

(f) requiring management to give access to the mine and to its records for the purposes of investigation of death or injury, accidents or dangerous or unusual occurrences, and

(g) requiring management to forbid a person to enter or engage in work where the person is impaired or has drugs or liquor in his possession and requiring management to forbid persons to engage in horseplay,

and a regulation may

(h) make different provisions for different mines or for different classes or types of mines,

(i) adopt, in whole or in part, a code or standard published by a national or international standards association, as amended from time to time,

(j) specify that the approval or consent of an inspector or some other person is required before a specified action may be taken, and, without limiting the foregoing, may require approval or consent before a specified type of equipment is used at a mine or continues to be used in specified circumstances,

(k) delegate to inspectors the power, by order, to vary codes, standards and other prescribed matters in the interests of health and safety in individual mines, and

(l) limit, restrict, or prohibit, for a prescribed period of time, exploration or mining of uranium, where the uranium exceeds a prescribed amount or proportion, within any or all mines, and to close, in the interest of health or safety, any mining operation in which uranium exceeding the prescribed amount or proportion is found.

(3) Where a regulation is made that results in a limitation, restriction, or prohibition on exploration or development or results in the closure of a mining operation, the chief inspector may, on conditions ordered by him, consent to

(a) the recommencement of exploration or development, or

(b) the opening of a mining operation that has been closed under that regulation.

Health, Safety and Reclamation Code Committee

35. (1) The minister shall establish a health, safety, and reclamation code committee consisting of the members the minister appoints.

(2) The chief inspector shall be a member and the chairman.

(3) The committee shall prepare a code dealing with all aspects of health, safety, and reclamation in the operation of a mine and shall amend the code from time to time as required.

(4) A provision of the code may specify that the approval or consent of an inspector or some other person is required before a specified action may be taken.

(5) Without limiting subsection (4), the code may require approval or consent before a specified type of equipment is used at a mine or continues to be used in specified circumstances.

(6) The code and any amendments to it come into force on approval of the Lieutenant Governor in Council.

(7) Where there is a conflict between a provision of the code and a provision of the regulations, the regulations apply.

Enforcement of the Code

36. (1) Where an inspector finds that a mine is not being operated in accordance with the provisions of the code, he may order the owner, agent, or manager to comply with the code.

(2) Where a person fails or refuses to comply with an order of an inspector under this section, the inspector may apply to the Supreme Court for an injunction restraining the person from disobeying the order.

Offence

37. (1) A person who obstructs, impedes or otherwise interferes with an inspector in carrying out his duties under this *Act* commits an offence.

(2) A person who contravenes a provision of this *Act*, the regulations, the code, or an order made under any of them commits an offence.

(3) A person who commits an offence is liable to a fine of not more than $100,000 or to imprisonment for not more than 1 year or both.

(4) Where an inspector serves a written notice on a person alleging a contravention of this *Act*, the regulations, or the code, or an order under any of them, that person, on conviction, is liable to a penalty, in addition to the penalties provided under subsection (3), not exceeding $5,000 and not less that $500 for every day during which the offence continues to be committed after receipt of the notice.

(5) Where a corporation commits an offence, a director or officer of the corporation who authorized, permitted or acquiesced in the offence is, notwithstanding that the corporation is convicted, liable to the penalty set out in subsection (3).

Annual Report

38. The chief inspector shall publish an annual report showing results during the previous year in achieving the purposes of this *Act*.

Mines Act Repealed

39. The *Mines Act*, S.B.C. 1980, c. 28, is repealed.

Commencement

40. This *Act* comes into force by regulation of the Lieutenant Governor in Council.

PURPOSE

The purpose of the Code is to:

(1) Protect employees and all other persons from undue risks to their health and safety arising out of or in connection with activities at mines.

(2) Safeguard the public from risks arising out of or in connection with activities at mines.

(3) Protect and reclaim the land and watercourses affected by mining.

(4) Monitor the extraction of mineral and coal resources and ensure maximum extraction with a minimum of environmental disturbance, taking into account sound engineering practice and prevailing economic conditions.

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NOTE:

Changes to Code from June 1990 version are shown in ***Bold Italics***.

Application of Code and General Rules

Definitions

"*accident*" means an unintended event that results in physical harm to a person or damage to property.

"*Board*" in this part means the Board of Examiners appointed under section 1.13.1 of the code.

"*C.S.A.*" means the Canadian Standards Association. Wherever a standard is referenced, it includes any supplements to the standard issued prior to enactment of this code.

"*certified person*" means a person who is certified by an agency or board acceptable to the chief inspector.

"*construction*" includes any activity involving the erection, modification, or dismantling of any structure or building and any roadbuilding associated therewith.

"*employees*" means all persons employed at a mine.

"*hazard*" means an unsafe or harmful condition, substance, or circumstance.

"*hazardous*" means the existence, or reasonable probability of the existence, of an unsafe or harmful condition, substance, or circumstance.

"*occupational illness*" means a condition that results from exposure, in a workplace, to a physical, chemical, or biological agent to the extent that the normal physiological mechanisms are affected causing impairment to the worker.

"*suitable*" means suitable to the satisfaction of the inspector.

Application of Code

Application

1.1.1 This code applies to all mines in the Province of British Columbia.

Absence of Code Requirements

1.1.2 Notwithstanding the absence of a specific code requirement, all work shall be carried out without undue risk to the health or safety of any person.

Conflicting Codes

1.1.3 If any conflict should arise between this code and any other code or standard with which compliance is required by this code, the provisions of this code shall prevail.

1.1.4 Where this code adopts in whole or in part a code or standard published by a national or international standards association it includes amendments to such standards as made from time to time.

Variance

Variance of Code Provision

1.2.1 Where the manager, the OHSC, or the local union at an individual mine is of the opinion that a provision of the code is not in the best interests of, or necessary for, health and safety at that mine, any one of them

(1) may submit a written request to the chief inspector for a variance of that provision,

(2) shall, when submitting a request for a variance, provide the other two parties at the minesite with copies of the submission, and

(3) may within 30 days of receiving a copy of the request for a variance, submit to the chief inspector written comments on the request and provide a copy to the other two parties.

Postings

1.2.2 The manager shall ensure that a legible copy of each variance granted is posted and maintained on conspicuously located bulletin boards at the mine.

Existing Variances

1.2.3 Upon proclamation of this code, the manager shall provide the chief inspector, the OHSC, and the local union with a copy of all existing variances under which the mine is operating.

Authority to Enter a Mine

Authorization

1.3.1 Other than an inspector, only persons authorized by the manager shall enter or be permitted to enter a mine.

Posting 1.3.2 Notice to this effect shall be posted at all road entrances to the mine.

Unauthorized Access 1.3.3 Unless authorized by the manager, no persons shall enter or leave a mine except by a recognized means of entry or exit.

Posting and Distribution of *Mines Act*, Regulations, and Code

Manager's Responsibility 1.4.1 The manager shall ensure that

(1) posters provided by the chief inspector containing selected sections of the *Mines Act*, the regulations, and the code are displayed at conspicuous locations,

(2) every employee is given a copy of the *Mines Act*, the regulations, and the code, and provided additional copies at cost, and

(3) a copy of the *Mines Act*, the regulations, and the code is maintained in every safety office and at other suitable locations and available to employees.

Hours of Employment

Eight Hour Maximum 1.5.1 The manager shall not permit the employment of a person at a mine for a period longer than 8 hours in any 24 hours.

Exceptions 1.5.2 Section 1.5.1 does not apply

(1) to emergencies where life or property is in danger,

(2) where urgent work is essential to the continuation of the ordinary working of a mine, providing it is only on an infrequent basis, or

(3) where work schedules incorporate periodic shift changes within a 24-hour period.

Restriction 1.5.3 Work performed pursuant to section 1.5.2 (2) and (3) shall not exceed a period of 16 hours in any 24-hour period.

Variance

1.5.4 Notwithstanding the *Employment Standards Act*, the chief inspector may, after investigating a joint request from the manager and the workers affected for a variance to section 1.5.1, and after an inspector has supervised a secret ballot at the mine, grant a variance by prescribing hours of work for designated areas or job classifications.

Variance for Exploration

1.5.5 An inspector may issue a permit to an employer engaged in preliminary mine exploration or development work to allow persons to work for periods longer than 8 hours in any 24-hour period provided that

(1) the permit shall only be valid for a period not exceeding twelve months,

(2) the inspector may cancel the permit at any time, and

(3) the permit does not apply to any underground work in excess of 8 hours.

1.5.6 The manager shall inform all employees affected by the permit issued under section 1.5.5.

Occupational Health and Safety Committee

Committee Members

1.6.1 A joint management-worker Occupational Health & Safety Committee composed of management and an equal or greater number of worker representatives chosen by the workers, shall be formed at every mine, and such committee shall have

(1) at least one worker representative, if the number of workers regularly employed is less than 20,

(2) two or more worker representatives, if the number of workers regularly employed is 20 or more, and

(3) two co-chairpersons, one a worker representative and the other a management representative, and they may alternate chairing the meetings.

Inspections

1.6.2 The committee shall

(1) inspect as many of the work sites as it considers appropriate every month and as soon as possible after the inspection, meet to discuss its findings and any other matters concerning health and safety, and

(2) prepare minutes of the meeting in a form acceptable to the district inspector, including a description of conditions found during the inspection.

1.6.3 The minutes of the meeting referenced in section 1.6.2 (2) shall be signed by the OHSC co-chairpersons or their designates and a copy shall without delay

(1) be filed with the manager,

(2) be forwarded to the local union(s),

(3) be forwarded to the district inspector, and

(4) be displayed in a conspicuous location at the mine until replaced by the minutes of the next meeting.

Accident Investigation

1.6.4 The OHSC co-chairpersons or their designates shall participate in the investigation of reportable accidents and dangerous occurrences in accordance with section 1.7.1.

1.6.5 The OHSC co-chairpersons or their designates shall be informed ***as soon as possible, but within 4 hours of the event,*** of accidents that cause injuries which require medical aid and, if they deem it necessary, they shall participate in the investigation.

Cooperation With Committee

1.6.6 The manager and all persons working at the mine shall cooperate fully with the OHSC by

(1) providing it with every reasonable facility for carrying out its inspections and investigations,

(2) allowing it access to all reports, plans, and records pertinent to the work of the OHSC, ***and***

(3) correcting the safety hazards noted in the OHSC minutes within 30 days or by the date agreed by the OHSC committee.

OHSC Training

1.6.7 Where 20 or more workers are regularly employed, the manager shall arrange for an inspector or other qualified person to provide the committee with training sessions on three occasions during the year.

Health and Safety Program

1.6.8 (1) The manager shall develop a Mine Health and Safety Program which includes the following sections

(a) a written policy statement,

(b) general safety rules,

(c) safe working procedures on a departmental basis,

(d) a list of hazardous materials, safe handling procedures and antidotes,

(e) provision for the regular monthly crew safety meetings,

(f) procedures for accident and serious incident investigation, and

(g) procedures for safety tour inspections.

(2) The OHSC shall review the Mine Health and Safety Program for completeness and effectiveness on an ongoing basis and submit its findings to the manager.

Accompany Inspector

1.6.9 The manager shall not unreasonably withhold a request by the worker co-chairperson ***to accompany the inspector on his inspection and in the event the request is denied the manager shall allow a designate of the worker co-chairperson to accompany the inspector.***

Entitlement to Time

1.6.10 The manager shall ensure that OHSC representatives are given reasonable time to carry out their duties as prescribed in the code and that time so spent is counted as time worked.

Accident or Dangerous Occurrences

Manager's Responsibility

1.7.1 In the event of any accident causing loss of life or serious personal injury or any dangerous occurrence as specified in section 1.7.3, the manager shall

(1) inform the district or the chief inspector, the OHSC, and the local union or employee association ***as soon as possible*** but within 16 hours of the event, and within one week send a written notification to the chief inspector and the district inspector,

(2) ensure that, except for the purpose of saving life or relieving human suffering, the scene of the accident or occurrence is not disturbed without approval of the inspector, and

(3) ensure that the investigation is carried out by persons knowledgeable in the type of work involved and the co-chairpersons of the OHSC or their designates.

Accident Investigation

1.7.2 On completion of the investigation, the manager shall prepare a report that

(1) whenever possible identifies the causes of the accident,

(2) identifies any unsafe conditions, acts, or procedures which contributed in any manner to the accident,

(3) makes recommendations which may prevent similar accidents, and

(4) is forwarded to the OHSC, chief inspector, and district inspector in the prescribed form.

Dangerous Occurrences

1.7.3 Dangerous occurrences to be reported shall include

(1) unexpected major groundfall or subsidence, whether on surface or underground, which endangers people or damages equipment or poses a threat to people or property,

(2) cracking or subsidence of a dam or impoundment dike; unexpected seepage or appearance of springs on the outer face of a dam or dike; loss of adequate freeboard, washout or significant erosion of a dam or dike, any of which might adversely affect the integrity of such structures,

(3) any accident involving a mine hoisting plant and including sheaves, hoisting rope, shaft conveyance, shaft, shaft timber, or headframe structure,

(4) unexpected inrush of water, mud, slurry, or debris,

(5) premature or unexpected explosion of explosives, gas, or any dust,

(6) significant inflow or release of explosive or other dangerous gas,

(7) unplanned stoppage of the main underground ventilation system,

(8) a mine vehicle going out of control,

(9) outbreak of fire if it endangers persons or threatens ***or damages*** equipment and all underground fires,

(10) electrical equipment failure or incident that causes or threatens to cause injury to persons or damage to equipment or property, and

(11) any other unusual accident or unexpected event which had the potential to result in serious injury.

1.7.4 The manager shall at the end of each month

(1) forward a report in a form prescribed by the chief inspector to the district inspector and the OHSC on all accidents that caused injuries requiring medical aid, and

(2) provide the OHSC with a report of all reported first aid cases.

Personal Protective Equipment

Manager's Responsibility

1.8.1 The manager shall

(1) except for protective footwear and prescription eyeglasses, supply properly fitted personal protective equipment as required by the code,

(2) ensure that workers are instructed in the use and maintenance of the equipment, the reasons for it, and also on its location and limitations, and

(3) ensure that the equipment is adequate for its purpose.

Workers' Responsibility

1.8.2 All persons shall wear the personal protective equipment as required by the code.

Protective Hat **1.8.3** A protective hat complying with the relevant requirements of CSA Standard Z94.1-M1977 "Industrial Protective Headgear", and suitable for the type of work or activity being performed, shall be worn by persons where there is a risk of head injury or where required by the manager or an inspector. Where conditions may cause the hat to be accidentally dislodged

(1) a device shall be incorporated into the hat and worn in order to prevent the hat being dislodged during a fall, and

(2) in the case of underground work, a chin strap or hearing protection muffs attached to the hat shall be worn.

Protective Footwear **1.8.4** Protective footwear complying with the relevant requirements of CSA Standard Z195-M1984 "Protective Footwear", and suitable for the type of work or activity being performed, shall be worn by persons where there is a risk of foot injury or where required by the manager or an inspector.

Eye Protection **1.8.5** Properly fitting goggles, face shields, or other eye protective equipment complying with the relevant requirements of CAN/CSA Standard Z94.3-M88 "Industrial Eye and Face Protectors", and suitable for the type of work or activity being performed, shall be worn by a person who

(1) is handling or is exposed to any material which is likely to injure or irritate the eyes,

(2) is engaged in any work in which there is a risk of eye injury,

(3) has 20/200 vision or is blind in either eye, or

(4) is working or passing through an area which the manager or inspector has designated as requiring such protection.

Contact Lenses **1.8.6** No person shall wear contact lenses where

(1) prohibited by the manager,

(2) gases, vapours, or other materials are present which may, if absorbed by contact lenses, harm the eyes, or

(3) dusts or other material are present which may harm the eyes or, because of irritation, cause a distraction which may expose the person to other injury.

Hearing Protection

1.8.7 Where noise levels exceed the requirements of Table 2-2, Part 2, persons shall wear hearing protectors which are selected, maintained and used in accordance with CSA Standard Z94.2-M1984 "Hearing Protectors".

Self Rescuer

1.8.8 ***All persons going underground in a mine shall carry an approved self rescuer on their person, or in the case of equipment operators maintained within arms reach while they are operating the equipment.***

Workplace Conditions

General

1.9.1 The manager shall

(1) take all reasonable and practicable measures to ensure that the workplace is free of potentially hazardous agents and conditions which could adversely affect the health, safety, or well-being of the workers,

Control

(2) where practicable, institute controls at the source to ensure that workers are not exposed to a level of any physical, chemical, or radiation hazard in excess of the limits prescribed in the code or by an inspector, with the exception of unusual short term or emergency situations, and

Variance

(3) require that persons wear effective personal protective equipment in any situation where control at the source, as required by section 1.9.1(2), is impractical.

Employees' Right to Refuse Work

Unsafe Work

1.10.1 A person shall not carry out any work or operate any equipment, tool, or appliance if he has reasonable cause to believe that to do so would create an undue hazard to the health or safety of any person.

1.10.2 A supervisor shall not knowingly perform or permit a worker to perform work which is, or could create, an undue hazard to the health or safety of any person.

Right to Refuse

1.10.3 A person who refuses to carry out any work or operate any equipment, tool, or appliance, in compliance with section 1.10.1, shall forthwith report the circumstances to his supervisor.

Supervisor Investigates

1.10.4 The supervisor receiving a report under section 1.10.3 shall forthwith investigate the matter and ensure that any hazardous condition is remedied without delay; or if, in his opinion the report is not valid, he shall inform the person who made the report.

Investigation

1.10.5 If the procedure provided for in section 1.10.4 fails to resolve the issue and the person continues to refuse to carry out the work, the supervisor ***or other management representative*** shall ***forthwith*** make an investigation in the presence of the person who made the report, together with another person having knowledge of the work in question and who is

(1) a worker representative or designate of the OHSC if available, or

(2) designated by the local union to represent the person refusing to carry out the work, or

(3) a co-worker selected by the person refusing to carry out the work.

Use of Alternate Worker

1.10.6 If the person still refuses to carry out the work after his supervisor and the other person have investigated the issue in accordance with section 1.10.5, and are both of the opinion that no undue hazard exists and that

(1) the refusal is considered to be justifiable for reasons peculiar to that particular person and,

(2) there is no justification for an alternate person to refuse to carry out the work in question then, ***the supervisor, after informing the alternate person of the reason for the refusal, may have him perform the work.***

Manager Investigates

1.10.7 If the procedures in sections 1.10.4, 1.10.5 and 1.10.6 fail to resolve the issue, the manager shall

(1) conduct an investigation and either develop a plan that is acceptable to the persons who will do the work and which will allow the work to proceed safely, or suspend further work and,

(2) if the work is suspended or is allowed to proceed, submit a report to the district inspector describing the situation and any remedial action taken.

Training

Training

1.11.1 The manager shall ensure that workers are adequately trained to do their job or are working under the guidance of someone who has competency both in the job and in giving instruction.

Training Programs

1.11.2 The manager shall establish and maintain training programs satisfactory to the chief inspector and shall

(1) ensure that all employees receive thorough orientation and basic instruction in safe work practices,

(2) ensure that underground miners have been suitably trained in basic underground mining skills and in any special skills necessary to perform safely any work underground to which they are assigned, and

(3) ensure that open pit miners and other surface workers have been suitably trained to perform safely any work to which they are assigned.

1.11.3 The manager shall have available for implementation the training programs required by section 1.11.2 prior to operation of the mine and, in the case of existing mines, within one year of the proclamation of the code.

Requirement to Train

1.11.4 The manager shall ensure that each worker who commences employment after the first day of June 1991 is trained in the appropriate program described in section 1.11.2.

Previous Training

1.11.5 In order to be exempt from the training programs required by section 1.11.2, a new employee shall

(1) produce proof that he has successfully completed suitable training during employment at another mine and/or,

(2) demonstrate, to the satisfaction of the manager, his proficiency in performing safely any work to which he will be assigned.

Supervision

Open Pit

1.12.1 The manager shall ensure that every worker employed in the mining activity of an open pit mine is under the supervision of

(1) the holder of an open pit shiftboss certificate where more than 12 workers are employed, or

(2) in the case of an open pit mine employing 12 workers or less, the holder of a supervisor certificate unless a shiftboss certificate is required by the district inspector.

Underground Non Coal

1.12.2 The manager shall ensure that every worker working underground in a mine, other than a coal mine, is under the supervision of the holder of an underground shiftboss certificate.

Underground Coal Mine

1.12.3 The manager of an underground coal mine shall ensure that

(1) every worker employed underground is under the supervision of the holder of an underground coal mine shiftboss certificate, and

(2) where more than 50 workers per shift are employed underground, a supervisor holding a second class certificate of competency shall be appointed as mine captain/general foreman and this person shall supervise all underground operations.

1.12.4 A certificate of competency of any class includes that of a lower class.

Shops, etc.

1.12.5 Within two years of the code being proclaimed, the manager shall ensure that every worker, other than those persons referred to in sections 1.12.1 (1), 1.12.2, and 1.12.3, and other than office employees, is under the supervision of the holder of a supervisor certificate.

1.12.6 Notwithstanding section 1.12.5, the manager may designate in writing a qualified person to act as a supervisor for a period not exceeding six months.

Manager

1.12.7 The manager of an underground coal mine, if required by the chief inspector, shall hold one of the following valid certificates of competency

(1) an underground coal mine shiftboss if fewer than 10 persons are employed underground,

(2) a second class certificate of competency if fewer than 30 but more than 9 persons per day are employed underground, and

(3) a first class certificate of competency if 30 or more persons per day are employed underground.

1.12.8 When he deems it necessary to the health and safety at a mine, the chief inspector may require the second level of supervision to hold a supervisor certificate.

Certification Procedure

Board Grants Certification

1.13.1 Examinations of applicants for underground shiftboss certificates, open pit shiftboss certificates, and certificates of competency shall be carried out by a Board of Examiners, consisting of the chief inspector as chairman and two other inspectors appointed by the chief inspector.

1.13.2 One member of the Board of Examiners shall hold first class certificates of competency when dealing with matters pertaining to the certification of candidates for underground coal mines.

1.13.3 The Board of Examiners shall issue a shiftboss and a competency certificate when satisfied that the applicant

(1) is conversant with the English language,

(2) is the holder of mine rescue and first aid certificates to a standard required by the Board and, in the case of an applicant for a shiftboss certificate and when required by the Board, also holds a blasting certificate to a standard required by the Board,

(3) has an adequate knowledge of the *Mines Act*, the regulations, and the code and of other information and material considered necessary by the Board,

(4) has taken courses and passed examinations acceptable to the Board, and

(5) has had at least three years' experience in and about the working of a mine, or has obtained a degree or diploma in engineering from a university or technical institute approved by the Board and has had not less than one year of experience and such experience shall be acceptable to the Board.

1.13.4 Notwithstanding section 1.13.3, the Board may grant a restricted shiftboss certificate where the type of mine operation would not require the applicant to hold all of the ***qualifications*** included in section 1.13.3.

1.13.5 The Board of Examiners may grant a certificate to an applicant who holds a similar certificate granted by a jurisdiction outside the Province, if the Board is satisfied that the standard of training and examination is equivalent to that required for the granting of a corresponding certificate under the code and, after oral examination of the applicant, that the applicant is sufficiently qualified.

Inspector Grants Certificate

1.13.6 The district inspector shall issue a supervisor certificate to an applicant who

(1) has passed an examination on the sections of the *Mines Act*, the regulations, and the code relevant to his area of supervision, and

(2) if required by the inspector, is the holder of a first aid certificate.

1.13.7 Notwithstanding sections 1.13.3 and 1.13.4, the district inspector may issue a provisional shiftboss certificate to an applicant who

(1) has acceptable experience and training,

(2) if required by the inspector, holds a blasting certificate.

Validity of Certificates

1.13.8 The validity of

(1) a shiftboss certificate or a certificate of competency issued under Part 1 of the code is conditional on the holder maintaining in force the other certificates required under section 1.13.3 (2), or as required by the Board, and

(2) a supervisor certificate, issued under Part 1 of the code, is conditional on the holder maintaining in force such other certificates as required by the district inspector.

1.13.9 Provisional shiftboss certificates will be valid for the period specified by the district inspector but such period shall not exceed six months.

Knowledge of *Act*, Regulations and Code

1.13.10 (1) Unless exempted by the Board, every holder of a shiftboss certificate or a certificate of competency issued under Part 1 of the code will be required every five years to demonstrate, to the satisfaction of the Board, his knowledge of the *Act*, the regulations, and the code insofar as his responsibility is concerned.

(2) Unless exempted by the district inspector, every holder of a supervisor certificate issued under Part 1 of the code will be required every five years to demonstrate, to the satisfaction of the district inspector, his knowledge of the *Act*, the regulations, and the code insofar as his responsibility is concerned.

(3) If the holder of a certificate fails to satisfy the Board or the district inspector as required under subsection (1) or (2), his certificate may be suspended until such time as he can do so.

Suspension of Certificate by District Inspecter

1.13.11 (1) A supervisor certificate issued under section 1.13.6 may be suspended for a stated period of time by the district inspector if, in his opinion, the holder fails to comply with the *Act*, the regulations, or the code, or is by reason of incompetence or negligence unfit to carry out his duties.

(2) The district inspector shall inform the chief inspector immediately of any such suspension and the chief inspector **may**:

(a) conduct an investigation,

(b) interview the holder of the certificate, and

(c) vary the decision of the district inspector or cancel the certificate.

1.13.12 (1) A shiftboss certificate or a certificate of competency issued under section 1.13.3 may be suspended by the district inspector if, in his opinion, the holder fails to comply with the *Act*, the regulations, or the code, or is, by reason of incompetence or negligence, unfit to carry out his duties.

(2) The district inspector shall immediately inform the Board of any such suspension, and the Board **may:**

(a) conduct an investigation,

(b) interview the holder of the certificate, and

(c) vary the suspension or cancel the certificate.

(3) The person whose certificate was cancelled or pursuant to 1.13.12 (2) may appeal the decision to the Minister.

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Industrial Hygiene

Definitions

“*asbestos free*” means containing less than 1% asbestos.

“*audiometric technician*” means a person certified by the Ministry or by an agency or person acceptable to the chief inspector.

“*biological monitoring*” means the recording of serial medical tests or examinations which indicate the progressing health status of an individual or group of individuals.

“*board*” in this part means the Workers’ Compensation Board of British Columbia.

“*dust exposure occupation*” means employment

(1) in an asbestos mine, or

(2) where a person is normally required to work more than 20% of his working time in any one month

- (a) underground in a mine,
- (b) in the mining activity of open pit and glory hole operations,
- (c) in crushing plants, assay grinding rooms, or coal cleaning plants,
- (d) in operations that involve dry milling or dry concentrating,
- (e) in wet concentrating plants where the plant is not adequately separated from dry crushing plants, or

(3) at other locations designated by the chief inspector.

“*employer*” means owner, agent, or manager as defined in the *Mines Act*.

“respirable combustible dust — RCD” means any dust which is respirable, and which is burned off when subjected to the procedure contained in the CANMET document number PROJ51/ADHOC 90.18 which is obtainable from the Resource Management Branch or from CANMET.

“*threshold limit value — time weighed average (TLV-TWA)*” means the time weighed average concentration for a normal 8 hour day and a 40 hour workweek, to which nearly all workers can be repeatedly exposed without adverse effect.

"*threshold limit value — short term exposure limit (TLV-STEL)*" means the concentration to which workers can be exposed continuously for a short period of time, provided the daily TLV-TWA is not exceeded. It must be no longer than 15 minutes, be separated by at least 60 minutes if repeated, and occur no more than 4 times per day.

"*threshold limit value — ceiling (TLV-C)*" means the concentration that must not be exceeded during any part of the working exposure.

Review of Standards

2.1.1 Any section of this Part being considered for possible change shall be reviewed by the Health, Safety and Reclamation Code Committee appointed under section 35 of the *Mines Act*.

Workplace Contaminants

Maximum Allowable Exposures

2.2.1 Employees shall not be exposed to airborne concentrations of chemical or physical agents in excess of the concentrations specified in Tables 2.1, 2.2. and appendices.

Shifts Longer Than 8 Hours

2.2.2 When shifts longer than 8 hours are being worked, the time-weighted average concentration of airborne contaminants shall be based on the "concentration equivalent" (Ceq) which is derived from the following formula:

$$\text{Ceq} = \frac{(\text{8-hour TWA}) \times 8}{\text{shift length in hours}}$$

Monitoring Contaminants

2.2.3 (1) The manager shall establish a written program, acceptable to the chief inspector, for a qualified person to monitor workplace contaminants as often as necessary to ensure compliance with section 2.2.1. The program shall specify the substances and locations to be monitored and the frequency of monitoring. The results of the program shall be available for examination by an inspector.

(2) A record of the monitoring program shall be kept on file for the life of the mine and transferred to the chief inspector upon abandonment of the mine.

Oxygen Content of Air

2.2.4 Persons shall not work or remain in any part of a mine where they may be exposed to air with an oxygen content less than 18% by volume unless provided with an alternate air supply.

Control of Workplace Hazards

Workplace to Be Hazard Free

2.3.1 The manager shall develop and implement an effective housekeeping program to ensure that all workplaces and travelways are maintained in a safe condition, that materials and equipment are stored in a manner so as not to endanger persons, and that appropriate action is taken whenever necessary to maintain a hazard-free environment.

2.3.2 Where the manager acts in accordance with section 1.9.1 (2), an inspector may, on his own, or upon a written request from the OHSC, require the manager to satisfy him that it is not practicable to comply with section 1.9.1 (2) with proper engineering controls, and the inspector shall communicate his decision to the OHSC.

Hazardous Materials and Waste

Asbestos Controls and Substitutes

2.4.1 The manager shall ensure that

(1) as effective, less hazardous, asbestos-free substitutes become available and practical for such items as brake lining, insulation, and fire retardant materials, they shall be used,

(2) where there is no substitute available for an asbestos-containing material, a procedure acceptable to the chief inspector is developed to protect the health of persons using, maintaining, or exposed to such material,

(3) notwithstanding subsection (2), items containing crocidolite asbestos are not used at a mine,

(4) spraying of asbestos, or material containing more than 1% of asbestos, is prohibited, and

(5) protective clothing and equipment made of material containing asbestos is used in such a manner as to prevent the release of asbestos fibres.

Disposal of Asbestos

2.4.2 (1) Where any work involves the use, handling, or disposal of asbestos or materials containing asbestos, the manager shall ensure that the procedures outlined in the manual "Safe Handling of Asbestos — A Manual of Standard Practices" published by the Board are followed, and that the district inspector and the OHSC are notified of the procedures.

(2) Where the manual, referred to in subsection (1), requires notices to be made to the Board, they shall be made to the chief inspector.

(3) This section does not apply to the mining and processing of asbestos at an asbestos mine.

Storage of Hazardous Materials

2.4.3 The manager shall ensure that all dangerous or potentially hazardous materials are stored in designated storage areas, acceptable to the district inspector, which are

(1) clearly identified by signs, placards, or similar devices, and

(2) well ventilated to prevent any accumulation of dangerous fumes and so arranged that incompatible materials, which could produce a harmful reaction if combined, are adequately separated.

Proper Containers

2.4.4 The manager shall ensure that all dangerous or potentially hazardous materials are stored in containers that are

(1) designed, constructed, and maintained in such a manner as to ensure proper containment of their contents under the environmental conditions in which they are stored, and

(2) kept sealed or covered when not in use and arranged so that they cannot be dislodged, fall, or suffer any other damage.

Hazardous Dust

2.4.5 In a building where dust or other material could by becoming airborne cause a hazard by restricting vision, or could cause a fire or explosion or be potentially hazardous if inhaled or ingested, it shall without delay be removed by suitable means such as vacuuming, wet sweeping, or wet shovelling, or be suppressed.

Hazardous Waste

2.4.6 Waste materials which could be detrimental to a person's health, or could cause a fire or explosion, shall be

(1) stored in impervious containers, labelled to clearly identify the contents and the nature of the hazard, and where the contents are flammable or capable of producing vapours or gases, the containers shall be covered and located in well-ventilated areas, and

(2) collected, handled, sorted, and disposed of by persons trained to safely handle the waste material and wearing any necessary protective clothing and equipment to safeguard their own and any other person's health and safety.

Spills

2.4.7 Spills or releases of hazardous waste materials shall be cleaned up as soon as possible by persons trained to safely handle the waste material and wearing any necessary protective clothing and equipment to safeguard their health and safety.

Flammable Waste Storage

2.4.8 Waste materials containing solvents, grease, paints, or other flammable substances shall be stored in covered metal containers while awaiting disposal.

Disposal of Wastes

2.4.9 All other waste materials not referred to in this Part shall be disposed of in accordance with local bylaws and in a manner acceptable to the authorities having jurisdiction over such disposal.

Radiation

2.4.10 The manager shall

(1) ensure that equipment which emits harmful levels of infrared or ultraviolet radiation is shielded to protect employees from exposure to such radiation, and

(2) supply personal protective equipment to any person who could become exposed to harmful radiation levels and the person shall wear the protective equipment.

2.4.11 The manager shall ensure that employees are not exposed to non-ionizing radiation which exceeds the recommendations contained in the publication "Safety Code 6, Recommended Safety Procedures for the Installation and Use of Radio Frequency and Microwave Devices in the Frequency Range of 10 MHz to 300 GHz", published by Health and Welfare, Canada.

2.4.12 All radioactive materials shall be used, handled, stored, transported, and disposed of in accordance with the Atomic Energy Control Regulations of Canada.

Spraying of Materials Containing Isocyanates

2.4.13 Where paints, protective coatings, adhesives, or insulating materials containing isocyanate compounds or other compounds that have similar sensitizing effects are being applied, persons shall be protected from the airborne contaminants by

(1) performing the work in an isolated enclosure having sufficient exhaust ventilation to ensure that contaminated air is not released from the enclosure into areas where unprotected persons can enter, and

(2) ensuring that all persons exposed to the contaminants are supplied with, and use, an air-supplied respirator or other effective respirator approved by the chief inspector.

Harmful Chemical Exposure

Emergency Wash Facilities

2.5.1 Where persons may be exposed to corrosive or other chemicals harmful to the eyes or skin, the manager shall ensure that eye wash equipment, emergency water baths or showers, or other suitable means are immediately available to effectively cleanse the affected body areas.

Protection From Contaminants

2.5.2 (1) Where the nature of the work causes a person's clothing or skin to be contaminated with substances which could cause injury to, or endanger the health of, the person or contaminate other areas on or off the minesite, the manager shall provide

(a) shower or wash facilities to enable employees to effectively remove all contaminants, and

(b) separate storage areas for street and work clothing to prevent contamination of the street clothing.

(2) Where contaminated clothing is not to be removed from the minesite, the manager shall provide

(a) a means for cleaning the contaminated clothing, or

(b) suitable protective clothing.

(3) A person exposed to contaminants shall

(a) cleanse any affected skin areas as soon as practicable,

(b) not consume or handle food or tobacco products until his hands and face are free of contamination,

(c) ensure that he removes contaminated clothing and disposes of it according to procedures acceptable to an inspector, and

(d) not leave the mine at the end of his shift until all affected areas of his skin have been cleansed of contamination.

Abrasive Blasting

No Silica or Lead

2.6.1 Abrasive blasting material containing 1%, or more, free silica or lead shall not be used.

2.6.2 All abrasive blasting and similar operations, when carried out within a building, shall be conducted in an isolated enclosure to prevent injury to persons. The enclosures shall have sufficient exhaust ventilation to ensure that a continuous inward flow of air is maintained at all openings in the enclosure during the blasting operation.

2.6.3 All abrasive blasting and similar operations, when carried out outside a building, shall be conducted in a place and manner to prevent injury to persons.

Protective Equipment

2.6.4 (1) Where an abrasive blasting operation is being carried out, the manager shall supply and employees shall wear air-supplied hoods or respirators suitable for the work, together with gloves, leggings, and clothing designed to protect the employees from dust, and projected abrasive or other material.

(2) Air supplied to the hood or respirator shall meet the requirements of CSA Standard CAN3-Z180.1-M85 "Compressed Breathing Air and Systems", as updated from time to time, and the volume of air supplied shall be sufficient for respiration and to prevent the entry of contaminants into the hood or respirator, and shall not be less than 105 L per minute at the mask.

Nozzles and Valves

2.6.5 (1) Blast cleaning nozzles shall be equipped with an operating valve which must be held open manually, and the normal operation of this valve shall not be defeated. A support shall be provided on which the nozzle can be secured when not in use.

(2) In addition to the operating valve required by subsection (1), another operating control shall be readily accessible to the operator to enable the flow of abrasive to be stopped immediately.

Workers to Be Removed

2.6.6 Where an abrasive blasting or a similar operation releases harmful substances to the atmosphere, persons who are not required to assist in the operation shall be removed from contaminated areas. Where such removal is not practical, the exposed persons shall be advised of the hazard and supplied with suitable personal protective equipment which they shall wear.

Noise

Mufflers Required

2.7.1 Any machinery or equipment which, when operating, exposes the operator or persons in the vicinity to noise levels in excess of those prescribed in Table 2-2, Part 2, for unprotected ears shall, if practicable, be fitted with a properly maintained muffler or other noise reducing device.

Instrument Specifications

2.7.2 Instruments used to measure noise levels shall meet the following standards, as updated from time to time

(1) for sound level meters IEC Standard Publication 651 (1979), "Sound Level Meters", for type 2 sound level meters or better,

(2) for integrating or averaging sound level meters IEC Standard Publication 804 (1985) "Integrating Averaging Sound Level Meters", for type 2 sound level meters or better, and

(3) for personal noise dosimeters ANSI Standard S1.25-1978, "Specification for Personal Noise Dosimeters", for type 2 tolerances or better.

2.7.3 Personal noise dosimeters shall have the following measurement specifications

(1) a noise measurement exchange rate of 3dB,

(2) a threshold level of 75 dBA or lower, and

(3) if measurement is expressed as a percentage, a reading of 100% for an average exposure of noise equivalent to 85 dBA for 8 hours (Lex).

Use of Lasers

Laser Standard

2.8.1 Where laser emitting devices are used, they shall be classified and used in accordance with the procedures outlined in ANSI Z136.1 — 1980 — "American National Standard for the Safe Use of Lasers".

Protection Required

2.8.2 Warning signs shall be posted and properly constructed screens or enclosures used wherever there could be a danger to any person from an inadvertent exposure to a laser beam.

Illumination

Lighting Standards

2.9.1 The manager shall ensure that at all working places, suitable and adequate illumination is provided meeting the standards set out in the ANSI/IES Standard RP-7-1979: "American National Standard Practice for Industrial Lighting", as updated from time to time, unless otherwise authorized by the code.

Surface Illumination

2.9.2 The manager shall ensure that there is a separate and independent emergency source of illumination at all places where a hazard could be caused by a failure of the normal lighting system, and the emergency lighting system shall

(1) where it is a part of a permanent installation, turn on automatically when the normal lighting fails,

(2) provide adequate illumination to allow employees to initiate emergency shutdown procedures and leave their work areas safely, and

(3) be tested as frequently as necessary to ensure that it will function when required.

Underground Illumination

2.9.3 The manager shall have suitable permanent lighting installed in an underground mine to provide adequate illumination in the following locations

(1) all workshops, service garages, and other places where moving machinery or equipment could be a hazard,

(2) main shaft stations and active shaft landings,

(3) first aid stations,

(4) conveyor galleries, drives, and transfer stations,

(5) any other working area where required by the district inspector.

Cap Lamps to Be Provided

2.9.4 The manager shall provide every person entering an underground mine with an approved cap lamp and the person shall keep the lamp in his possession while he is underground.

Cap Lamps Specifications

2.9.5 All newly purchased cap lamps, and after January 1995 all cap lamps, shall be capable of providing a peak illuminance of at least 1500 lux at 1.2 m from the light source, throughout a working shift.

2.9.6 The manager of an underground mine shall develop a procedure for assessing and maintaining cap lamps and a copy of the procedure and the results of the assessment shall be made available to an inspector.

2.9.7 Portable lamps used in an underground mine shall be of a type approved by the chief inspector.

Auxiliary Lighting

2.9.8 Where a person has to assess ground conditions in an underground mine at a distance greater than the effective range of a cap lamp, the manager shall supply, and the person shall use, auxiliary lighting adequate for safely carrying out the assessment.

Thermal Environment

Heat or Cold Stress

2.10.1 Where it is not reasonably practical to control thermal conditions, and the nature of the work can cause distress or illness to a person, the manager shall institute a program to

(1) instruct employees in the possible adverse effects of their working environment,

(2) instruct employees how to recognize symptoms of heat or cold stress and what emergency treatment should be applied,

(3) monitor thermal conditions to identify when persons could be adversely affected by heat and cold stress, and if protective measures are required to adequately protect persons, he shall advise the chief inspector of the measures taken.

Lunchrooms and Sanitary Conveniences

Drinking Water

2.11.1 The manager shall provide a source of cool, potable drinking water complying with the drinking water standards of the Ministry of Health in locations that

(1) are reasonably accessible to employees,

(2) are kept clean and in a sanitary condition, and

(3) are designed to permit the water to be dispensed and drunk in a sanitary manner.

Use of Solder

2.11.2 New installations of pipes and vessels, and changes to existing pipes and vessels which carry water to be used in whole or in part by persons for drinking purposes, shall not be constructed using solder containing more than 1% lead.

Lunchrooms

2.11.3 Where 7 or more persons regularly congregate to eat food, other than where the mining activity of an open pit mine is performed, a lunchroom shall be provided which shall

(1) be heated, lighted, and ventilated,

(2) have or be located near facilities for persons to wash with cold and hot running water and dry their hands,

(3) not have an entrance through a toilet facility,

(4) contain sufficient fire retardant receptacles with lids, which shall be used by employees to dispose of all waste food, paper, and other related material, and the containers shall be emptied regularly,

(5) have suitable seating facilities equipped with backrests and tables with impervious top surfaces which shall be kept in clean and sanitary condition,

(6) be constructed of materials which can be, and shall be, maintained in a clean condition,

(7) have the following minimum dimensions

No. of Persons	sq. m/Person
25 or less	1.2 (min. size 6 sq.m)
26 to 74	1
75 to 149	0.66
150 to 499	0.56
500 or more	0.46

(8) be located in an area away from process chemicals and contaminants.

2.11.4 Where more than 3 persons and fewer than 7 persons regularly congregate to eat food, other than where the mining activity at an open pit mine is performed, an eating area shall be provided which complies with 2.11.3. (1), (4), (5), (6), (7), and (8), and provided with facilities for persons to clean their hands.

Mine Dry

2.11.5 (1) The manager shall provide separate facilities for male and female employees to wash and shower, and to change and dry their clothing

(a) at a surface mine where persons are subject to dusty, dirty, or wet conditions, and

(b) at an underground mine, and this facility shall include separate storage facilities for street clothes and working clothes.

(2) The facilities shall have separate approaches with signs clearly indicating for which sex they have been provided.

Location of Mine Dry

2.11.6 A mine dry shall not be located

(1) in a headframe, boiler room, engine room, bunkhouse, or dining room unless a separate, properly constructed room is provided, or

(2) nearer than 15 m to a shaft house or portal house unless it is constructed of non-combustible materials.

2.11.7 The mine dry shall be adequately heated, lighted and ventilated, kept clean and sanitary, and have one shower for every 7 persons leaving work at the same time.

Temperature of Washing Water

2.11.8 Water that is to be used for personal washing shall not exceed 60 degrees Celsius at any outlet, and shall not be mixed directly with steam.

Toilet Facilities

2.11.9 The manager shall provide separate toilet facilities for male and female employees, having separate entrances with signs clearly indicating for which gender they have been provided.

2.11.10 On the surface of a mine, the manager shall provide washroom facilities that are conveniently located and equipped with

(1) one toilet and one urinal for every 25 male employees or fraction thereof, and one toilet for every 9 female employees or fraction thereof, except where the maximum number of employees on any shift is fewer than 6 when one toilet is required,

(2) one wash basin, or equivalent facility, provided with hot and cold running water for every 15 employees or fraction thereof, and

(3) a means for drying hands hygienically, and

(4) adequate heat, light, and ventilation.

2.11.11 For the purposes of section 2.3.8

(1) each 600 mm of straight trough urinal may be counted as one urinal, and

(2) each 500 mm of circumference of a circular wash fountain or length of a straight trough wash basin may be counted as one wash basin.

Toilets

2.11.12 A toilet on the surface of a mine shall be

(1) of the water flushing type or other sanitary design, located in an individual compartment with a door that locks, and with walls and floor of a finish or material that can be easily cleaned,

(2) fitted with an open-front seat and provided with a reasonable supply of toilet paper,

(3) provided with a clothes hook and lighting where electricity is available, and

(4) kept clean and sanitary, and any waste products shall be disposed of regularly.

Toilets Underground or Portable on Surface

2.11.13 Toilets in an underground mine and portable toilets on surface shall be conveniently located in well ventilated areas having regard to the number of employees in the various parts of the mine, and

(1) they shall be supplied with toilet paper and provide privacy,

(2) be maintained in a hygienic condition and have all waste material removed regularly, and

(3) be equipped with facilities for persons to clean their hands

2.11.14 No person shall deposit faeces in any place in an underground mine other than a toilet.

Seasonal Camps

2.11.15 Sanitary conveniences at seasonal, short-term mining camps shall comply with the Industrial Camps Health Regulations under the *Health Act*.

Medical Surveillance Programs

Program Requirements

2.12.1 (1) The manager shall notify the chief inspector when he believes there is a need for a medical surveillance program, for persons

(a) in a dust exposure occupation,

(b) exposed to excessive noise,

(c) exposed to any chemical, physical, or radiation agent specified by the chief inspector.

(2) A medical surveillance program, when required by the chief inspector, shall be modelled after the "Guidelines for Standard Practice for Medical Monitoring Programs" issued by the chief inspector and shall be of a form satisfactory to him.

Audiometric Testing

2.12.2 Audiometric testing shall be carried out by a certified audiometric technician.

2.12.3 (1) The manager shall advise persons working in a dust, excessive noise, chemical, physical, or radiation exposure occupation, of the nature of the health risks and that a medical surveillance program is available, and the person, at his option, may choose to participate in the program.

(2) A person participating in the medical surveillance program may attend the doctor of his choice to undergo the examinations and tests required by 2.12.1 (2).

Medical Advice

2.12.4 A medical surveillance program, required by section 2.12.1, shall ensure that

(1) each person examined or clinically tested is

- (a) aware of the nature of the health risks and effects for which he is being examined,
- (b) advised on his medical fitness to work,
- (c) advised of any work restriction resulting from his medical condition,
- (d) instructed in health precautions required, and
- (e) provided with a copy of the results of the medical examination.

(2) a hearing conservation program is developed and followed.

Maintenance of Records

2.12.5 (1) Personal medical records shall be maintained on a confidential basis by the physician or nurse, and shall not be made available to the manager or any other person, except as required by statute, without the informed written consent of the individual.

(2) Audiometric information shall be made available to the chief inspector.

Chemical Analysis

2.12.6 Whenever a chemical analysis is required for biological monitoring it shall be carried out at a laboratory acceptable to the chief inspector.

Programs at Owner's or Agent's Expense

2.12.7 All medical examinations and tests performed on a person during a medical surveillance program, shall be done at the owner's or agent's expense and the expense shall not be passed on to that person.

Workplace Hazardous Materials Information System (WHMIS)

Definitions

"*bulk shipment*" means a shipment of a controlled product that is contained, without intermediate containment or intermediate packaging, in

(1) a vessel with a water capacity of more than 454 L,

(2) a freight container, a portable tank, a road vehicle, a railway vehicle, a ship, barge or other type of vessel, or an aircraft, or

(3) a pipeline.

"*commission*" means the Hazardous Materials Information Review Commission established by the *Hazardous Materials Information Review Act* (Canada).

"*container*" includes a bag, barrel, bottle, box, can, cylinder, drum, storage tank, or similar package or receptacle.

"*controlled product*" means a product, material or substance specified by regulations made pursuant to section 15 (1) (a) of the *Hazardous Products Act* (Canada) as products, materials and substances included in any of the classes listed in Schedule II of that *Act*.

"*hazard information*" means information on the proper and safe use, storage, and handling of a controlled product and includes information relating to its toxicological properties.

"*hazardous substance*" means a substance which may be injurious to the health or safety of a worker.

"*hazardous waste*" means a controlled product that is intended for disposal.

"*label*" includes a mark, sign, device, stamp, seal, sticker, ticket, tag, or wrapper.

"*manufactured article*" means an article that is formed to a specific shape or design during manufacture, the intended use of which, when in that form, is dependent in whole or in part on its shape or design, and that under normal conditions of use will not release or otherwise cause a person to be exposed to a controlled product.

"*material safety data sheet (MSDS)*" means a document disclosing the information referred to in section 13 (a) (i) to (v) of the *Hazardous Products Act* (Canada) and sections 9 (2) of the Controlled Products Regulations (Canada).

"*product identifier*" means, in respect of a controlled product, the brand name, code name, or code number specified by a supplier or the chemical name, common name, generic name, or trade name.

"*readily available*" means, when used in connection with a material safety data sheet, available in a place where a person can easily access and study the information it contains.

"*risk phrase*" means, in respect of a controlled product or a class, division, or subdivision of controlled products, a statement identifying a hazard that may arise from the nature of the controlled product or the class, division, or subdivision of controlled products.

"*supplier label*" means a label provided by a supplier that complies with the requirements, discloses the information, and displays the hazard symbols referred to in section 13 (b) of the *Hazardous Products Act* (Canada), section 17 of the Controlled Products Regulations (Canada).

"*supplier material safety data sheet*" means a material safety data sheet provided by a supplier.

"*workplace label*" means a label that discloses a product identifier and information for the safe handling of a controlled product, and that indicates that a material safety data sheet, if supplied or produced, is available.

Application **2.13.1** (1) This section applies to employers and employees in respect of controlled products used, stored, or handled at a mine.

(2) Notwithstanding subsection (1), the provisions of this code in respect of a supplier label and a material safety data sheet do not apply where the controlled product is an

(a) explosive within the meaning of the *Explosives Act* (Canada),

(b) cosmetic, device, drug or food within the meaning of the *Food and Drug Act* (Canada),

(c) controlled product within the meaning of the *Pest Control Products Act* (Canada),

(d) prescribed substance within the meaning of the *Atomic Energy Control Act* (Canada), or

(e) product, material, or substance packaged as a consumer product and in quantities normally used by the consuming public.

(3) Notwithstanding subsection (1), this code does not apply where the controlled product is

(a) wood or a product made of wood,

(b) tobacco or a product made of tobacco,

(c) a manufactured article, or

(d) being transported or handled pursuant to the requirements of the *Transportation of Dangerous Goods Act* (Canada) or the *Transport of Dangerous Goods Act*.

(4) Notwithstanding subsection (1), this code does not apply to a hazardous waste except that the manager shall ensure the safe storage and handling of a hazardous waste generated at that mine through the combination of any mode of identification and employee education.

Use, Storage, Handling

2.13.2 (1) The manager shall ensure that a controlled product is not used, stored, or handled in a mine, unless all the applicable requirements of this code in respect of labels, identifiers, material safety data sheets, and employee education are complied with.

(2) Notwithstanding subsection (1), the manager may store a controlled product in a mine while actively seeking information required by this code.

Worker Education

2.13.3 (1) The manager shall ensure that a person who works with a controlled product or in proximity to a controlled product is informed about all hazard information received from a supplier concerning that controlled product as well as any further hazard information of which the manager is aware or ought to be aware concerning the use, storage, and handling of that controlled product.

(2) Where a controlled product is produced in a mine, the manager shall ensure that a person who works with that controlled product or in proximity to that controlled product is informed about all hazard information of which the manager is aware or ought to be aware concerning that controlled product and its use, storage, and handling.

Worker Training

2.13.4 (1) The manager shall ensure that a person who works with a controlled product or in proximity to a controlled product is instructed in

(a) the content of the applicable supplier label and workplace label, and the purpose and significance of the information contained on the label,

(b) the content required on a material safety data sheet and the purpose and significance of the information contained on the material safety data sheet,

(c) procedures for the safe use, storage, handling, and disposal of a controlled product,

(d) the safe use, storage, handling, and disposal of a controlled product contained or transferred in

  (i) a pipe,

  (ii) a piping system including valves,

  (iii) a process vessel,

  (iv) a reaction vessel, or

  (v) a tank car, tank truck, ore car, conveyor belt, or similar conveyance.

(e) procedures to be followed where the controlled product escapes from equipment or from another product, and

(f) procedures to be followed in case of an emergency involving a controlled product.

(2) The manager shall ensure that the program of employee education required by section 2.13.4 (1) is developed and implemented

(a) for that mine and related to the manager's program for the prevention of injuries and occupational disease, and

(b) in consultation with the occupational health and safety committee.

(3) The manager shall ensure, so far as is reasonably practicable, that the program of employee instruction required by section 2.13.4 (1) results in a person being able to apply the information as needed to protect his health and safety.

(4) The manager shall review at least annually, or more frequently if required by a change in work conditions or available hazard information, and in consultation with the joint occupational safety and health committee, the instruction and training provided to employees concerning controlled products.

Supplier Label

2.13.5 (1) The manager shall ensure that the container of a controlled product or a controlled product received at a mine is labelled with a supplier label.

(2) Subject to subsection (3) and to subsection 2.13.15, as long as any amount of a controlled product remains in a mine in the container in which it was received from the supplier, the manager shall not remove, deface, modify, or alter the supplier label.

(3) Where a label applied to a controlled product or a container of a controlled product becomes illegible or is accidentally removed from the controlled product or the container, the manager shall replace the label with either a supplier label or a workplace label.

(4) A manager who has received a controlled product in a multi-container shipment, where the individual containers have not been labelled by the supplier, shall apply to each container a label that meets the requirements of the Controlled Products Regulations (Canada).

(5) Where the controlled product imported under section 23 of the Controlled Products Regulations (Canada) is received at the mine without the supplier label, the manager shall apply a label that meets the requirements of that regulation.

(6) A manager who has received a controlled product transported as a bulk shipment shall

(a) apply a supplier label to the container of the controlled product or to the controlled product at the mine, or

(b) where, pursuant to section 15 of the Controlled Products Regulations (Canada) the supplier is not required to label a controlled product transported as a bulk shipment, the manager shall apply a workplace label to the container of a controlled product or to the controlled product at the mine.

Workplace Label for Employer-produced Products

2.13.6 (1) Where a process produces a controlled product at a mine, the manager shall ensure that the controlled product or the container of the controlled product has applied to it a workplace label.

(2) For purposes of subsection (1), "produces" does not include the production of a controlled product that escapes from equipment or from another product.

(3) Subsection (1) does not apply when the controlled product is in a container that is intended to contain the controlled product for sale or distribution and the container is, or is about to be, appropriately labelled.

Workplace Label for Decanted Products

2.13.7 (1) Where a controlled product in a mine is in a container other than the container in which it was received from a supplier, the manager shall ensure that the container has applied to it a workplace label.

(2) Subsection (1) does not apply to a portable container that is filled directly from a container that has applied to it a supplier label or workplace label

(a) if the controlled product
  (i) is under the control of and is used exclusively by the worker who filled the portable container,
  (ii) is used only during the shift in which the portable container was filled, and
  (iii) the content of the container is clearly identified, or
(b) if all of the controlled product is required for immediate use.

Identification of a Controlled Product in Piping Systems and Vessels

2.13.8 Where a controlled product in a mine is contained or transferred in a pipe, a piping system including valves, a process vessel, a reaction vessel, or a tank car, tank truck, ore car, conveyor belt, or similar conveyance, the manager shall ensure the safe use, storage, and handling of the controlled product through employee education and the use of colour coding, labels, placard, or any mode of identification.

Placard Identifiers

2.13.9 Notwithstanding sections 2.13.5, 2.13.6 and 2.13.7 where the controlled product is not in a container, or in a container in a form intended for export, the manager may fulfill the labelling requirements under sections 2.13.5, 2.13.6 and 2.13.7 by posting a placard which

(1) discloses the information required for a workplace label, and

(2) is of a size and in locations so that the information is conspicuous and clearly legible to employees.

Laboratory Label

2.13.10 (1) A label of a container for a controlled product that originates from a laboratory supply house and is packaged in quantities of less than 10 kg for each container and that is intended for use in a laboratory shall disclose

(a) a product identifier,
(b) where a material safety data sheet is available, a statement indicating that fact, and
(c) the following information that is applicable to the product: risk phrases, precautionary measures, or first aid measures.

(2) Notwithstanding section 2.13.7 (2), the manager shall ensure that the contents of a container of a controlled product are clearly identified on the container where

(a) the container is not the container in which the controlled product was received from the supplier, and

(b) the manager intends to use the controlled product, or it is in the normal course of his business, used exclusively in a laboratory.

(3) The manager shall ensure that a controlled product undergoing analysis, tests, or evaluations in a laboratory is clearly identified.

Supplier Material Safety Data Sheets

2.13.11 (1) A manager who acquires a controlled product for use at a mine shall obtain a supplier material safety data sheet in respect of that controlled product.

(2) Where a supplier material safety data sheet obtained under subsection (1) in respect of a controlled product is 3 years old, the manager shall, if possible, obtain from the supplier an up-to-date supplier material safety data sheet in respect of any of the controlled product that remains at the mine.

(3) Where the manager is unable to obtain a material safety data sheet as required by subsection (2), the manager shall add any new hazard information applicable to that controlled product to the existing supplier material safety data sheet on the basis of the ingredients disclosed in that document.

(4) The manager may provide a material safety data sheet in a format different from the format provided by the supplier or conta[illegible]dditional hazard information, if the material safety dat[illegible] provided by the manager

(a) subject to section 2.13.15, includes at least the content of the supplier material safety data sheet, and

(b) indicates that the supplier material safety data sheet is available at the mine

(5) Where a supplier is exempted under section 9 or 10 of the Controlled Products Regulations (Canada) from the requirement to provide a material safety data sheet for a controlled product, the manager is exempt from the requirement to obtain and provide a material safety data sheet for that controlled product.

(6) Where a controlled product is received at a laboratory and the supplier has provided a material safety data sheet, the manager shall ensure that a copy of the material safety data sheet is readily available to the employees in the laboratory.

(7) Where a controlled product is received or produced at a laboratory and the manager has produced a material safety data sheet, the manager shall ensure that the material safety data sheet is readily available to employees in the laboratory.

Employer Material Safety Data Sheets

2.13.12 (1) Where a process produces a controlled product in the mine, the manager shall prepare a material safety data sheet in respect of the product which discloses, subject to section 2.13.15, the information required under the Controlled Products Regulations (Canada).

(2) For the purpose of subsection (1), "produces" does not include the production of a controlled product that escapes from equipment or from another product, nor does it include intermediate products undergoing reaction within a reaction or process vessel.

(3) The manager shall update the material safety data sheet referred to in subsection (1)

(a) as soon as practicable after new hazard information becomes available to the manager, and

(b) at least every 3 years.

Availability of a Material Safety Data Sheet

2.13.13 (1) The manager shall ensure that a copy of a material safety data sheet required by sections 2.13.11 or 2.13.12 is made readily available at the mine to *the occupational health and safety committee and persons who may be exposed to the controlled product.*

(2) Notwithstanding subsection (1), when the manager is required by subsection (1) to make a material safety data sheet readily available, the material safety data sheet may be made available on a computer terminal if the manager

- (a) takes all reasonable steps to keep the terminal in active working order,
- (b) makes the material safety data readily available on the request of a person, and
- (c) provides training in accessing computer stored material safety data sheets to
  - (i) one or more employees working at a mine where the material safety data sheet is available on a computer terminal, and
  - (ii) members of the occupational health and safety committee.

Deletions From a Material Safety Data Sheet

2.13.14 Where a manager claims an exemption under section 2.13.15, the manager may delete the information that is the subject of the claim from the material safety data sheet provided under sections 2.13.11 and 2.13.12 for the time period in subsection 2.13.15 (4), but may not delete hazard information.

Confidential Business Information

2.13.15 (1) An employer who is required by this code to disclose on a label or a material safety data sheet

- (a) the chemical identity or concentration of an ingredient of a controlled product,
- (b) the name of any toxicological study that identifies an ingredient of a controlled product,
- (c) the chemical name, common name, generic name, trade name, or brand name of a controlled product, or
- (d) information that could be used to identify a supplier of a controlled product

may, if the manager considers such information to be confidential business information, claim an exemption from the requirement to disclose that information.

(2) The claim under subsection (1) shall be made to the commission established under the *Hazardous Materials Information Review Act* (Canada) and shall be filed in accordance with the procedure established under that *Act* and the regulations made under it.

(3) Under section 32 of the *Hazardous Materials Information Review Act* (Canada), the commission shall exercise the powers and perform the functions specified in that *Act* and the procedures prescribed by regulations under that *Act* in respect of a claim made under subsection (1).

(4) Information that the manager considers to be confidential business information is exempt from disclosure from the time a claim is filed under subsection (1) until the claim is finally determined by the commission and for a period of 3 years after that if the claim is found to be valid.

(5) The manager who makes a claim under subsection (1) shall abide by decisions of the commission and orders of the commission.

(6) Appeals from decisions made by the commission under this section may be made under and in accordance with the provisions of the *Hazardous Materials Information Review Act* (Canada) and any regulations made under that *Act*.

Confidentiality of Information

2.13.16 (1) Where a person enforcing this code obtains information from the commission under section 46 (2) (e) of the *Hazardous Materials Information Review Act* (Canada), the person to whom the information is communicated shall keep it confidential and shall not disclose such information to any person except for the purposes of enforcement of this code.

(2) A person to whom information is disclosed pursuant to subsection (1) shall keep the information confidential.

Disclosure in Medical Emergencies

2.13.17 (1) The manager shall, in respect of a controlled product that is or was present in the mine, provide information respecting the controlled product, including confidential business information in the possession of the employer, to

(a) a mmber, in good standing, of the College of Physiciar and Surgeons of British Columbia, or

(b) a prson registered or licensed under the *Nurses (Reistered) Act*, the *Nurses (Registered Psychiatric) Act* or the *Nurses (Licensed Practical) Act* and autorized to practise nursing in British Columbia,

who requests information on the controlled product for the purpose of making a medical diagnosis of, or rendering medical treatment to, person who used, handled, or was exposed to the controlled product at a mine.

(2) No peson to whom information is provided by an employer puruant to subsection (1) shall communicate or disclose the information to any other person except as may be necessary for the purposes mentioned in that subsection.

(3) A persn to whom information is disclosed under subsection (2) shall keep the information confidential.

Prohibition Against Disclosure

2.13.18 No person shall use, disclose, or release information protectec as confidential business information under this code except as provided by sections 2.13.16 and 2.13.17.

2.13.19 The manager shall ensure that persons who work with, or in th proximity of, a controlled product or a product described in ection 2.13.20, shall comply with the procedures for the safe strage, handling, and use of those products, including the wearig of suitable personal protective equipment, as described in the material safety data sheet for those products.

2.13.20 Notwithstanding section 2.13.1, where persons who work with a substance, or in the proximity of a substance, which is not a controlled product and which substance could cause adverse health effects to those persons, then the manager shall comply with sections 2.13.3, 2.13.4, 2.13.5, 2.13.6, 2.13.7, 2.13.8, 2.13.9 and 2.13.10 as if the substance is a controlled product.

Adopted Appendices

Appendix A

Carcinogens

The Chemical Substances Threshold Limit Values Committee classifies certain substances found in the occupational environment as either confirmed or suspected human carcinogens. The present listing of substances which have been identified as carcinogens takes two forms: those for which a TLV has been assigned and those for which environmental and exposure conditions have not been sufficiently defined to assign a TLV. Where a TLV has been assigned, it does not necessarily imply the existence of a biological threshold; however, if exposures are controlled to this level, one would not expect to see a measurable increase in cancer incidence or mortality.

The TLV Committee of the ACGIH considers information from the following kinds of studies to be indicators of a substance's potential to be a carcinogen in humans: epidemiology studies, toxicology studies and, to a lesser extent, case histories. Scientific debate over the existence of biological thresholds for carcinogens is unlikely to be resolved in the near future. Because of the long latent period for many carcinogens and for ethical reasons, it is often impossible to base timely risk-management decisions on results from human studies.

In order to recognize the qualitative differences in research results, two categories of carcinogens are designated in the code:

A1 — Confirmed Human Carcinogens, and
A2 — Suspected Human Carcinogens

Exposures to carcinogens must be kept to a minimum. Persons exposed to A1 carcinogens without a TLV should be properly equipped to virtually eliminate all exposure to the carcinogen. For A1 carcinogens with a TLV and for A2 carcinogens, employee exposure by all routes should be carefully controlled to levels consistent with the experimental and human experience data. Please see the Documentation of the Threshold Limit Values for a more complete description and derivation of these designations.

Appendix B

Substances of Variable Composition

B1. Polytetrafluoroethylene * decomposition products. Thermal decomposition of the fluorocarbon chain in air leads to the formation of oxidized products containing carbon, fluorine, and oxygen. Because these products decompose in part by hydrolysis in alkaline solution, they can be quantitatively determined in air as fluoride to provide an index of exposure. No TLV is recommended pending determination of the toxicity of the products, but air concentration should be minimal.

B2. Welding Fumes — Total Particulate (NOC)+ TLV-TWA, 5 mg/m³

Welding fumes cannot be classified simply. The composition and quantity of both are dependent on the alloy being welded and the process and electrodes used. Reliable analysis of fumes cannot be made without considering the nature of the welding process and system being examined; reactive metals and alloys such as aluminum and titanium are arc-welded in a protective, inert atmosphere such as argon. These arcs create relatively little fume, but an intense radiation which can produce ozone. Similar processes are used to arc-weld steels, also creating a relatively low level of fumes. Ferrous alloys also are arc-welded in oxidizing environments which generate considerable fumes, and can produce carbon monoxide instead of ozone. Such fumes generally are composed of discreet particles of amorphous slags containing iron, manganese, silicon, and other metallic constituents depending on the alloy system involved. Chromium and nickel compounds are found in fumes when stainless steels are arc-welded. Some coated and flux-cored electrodes are formulated with fluorides and the fumes associated with them can contain significantly more fluorides than oxides. Because of the above factors, arc-welding fumes frequently must be tested for individual constituents which are likely to be present to determine whether specific TLVs are exceeded. Conclusions based on total fume concentration are generally adequate if no toxic elements are present in welding rod, metal, or metal coating and conditions are not conducive to the formation of toxic gases.

Most welding, even with primitive ventilation, does not produce exposures inside the welding helmet above 5 mg/m³. That which does, must** be controlled.

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* Trade Names: Algoflon, Fluon, Teflon, Tetran.

+ Not otherwise classified (NOC).

** Not ACGIH

Appendix C

Threshold Limit Values for Mixtures

When two or more hazardous substances which act upon the same organ system are present, their combined effect, rather than that of either individually, should be given primary consideration. In the absence of information to the contrary, the effects of the different hazards should be considered as additive. That is, if the sum of the following fractions

$$\frac{C_1}{T_1}+\frac{C_2}{T_2}+\ldots\frac{C_n}{T_n}$$

exceeds unity, then the threshold limit of the mixture should be considered as being exceeded. C_1 indicates the observed atmospheric concentration, and T_1 the corresponding threshold limit (see Example A.1 and B.1).

Exceptions to the above rule may be made when there is a good reason to believe that the chief effects of the different harmful substances are not in fact additive, but independent as when purely local effects on different organs of the body are produced by the various components of the mixture. In such cases the threshold limit ordinarily is exceeded only when at least one member of the series (C_1/T_1+or+C_2/T_2, etc.) itself has a value exceeding unity (see Example B.1).

Synergistic action or potentiation may occur with some combinations of atmospheric contaminants. Such cases at present must be determined individually. Potentiating or synergistic agents are not necessarily harmful by themselves. Potentiating effects of exposure to such agents by routes other than that of inhalation is also possible, e.g., imbibed alcohol and inhaled narcotic (trichloroethylene). Potentiation is characteristically exhibited at high concentrations, less probably at low.

When a given operation or process characteristically emits a number of harmful dusts, fumes, vapors, or gases, it will frequently be only feasible to attempt to evaluate the hazard by measurement of a single substance. In such cases, the threshold limit of this substance should be reduced by a suitable factor, the magnitude of which will depend on the number, toxicity, and relative quantity of the other contaminants ordinarily present.

Examples of processes which are typically associated with two or more harmful atmospheric contaminants are welding, automobile repair, blasting, painting, lacquering, certain foundry operations, diesel exhausts, etc.

Examples of TLVs for Mixtures

A. Additive effects. The following formulae apply only when the components in a mixture have similar toxicologic effects; they should not be used for mixtures with widely differing reactivities, e.g., hydrogen cyanide and sulfur dioxide. In such case the formula for Independent Effects (B) should be used.

1. General case, where air is analyzed for each component, the TLV of mixture =

$$\frac{C_1}{T_1}+\frac{C_2}{T_2}+\frac{C_3}{T_3}+\cdots=1$$

Note: It is essential that the atmosphere be analyzed both qualitatively and quantitatively for each component present, in order to evaluate compliance or non-compliance with this calculated TLV.

Example A.1: Air contains 400 ppm of acetone (TLV, 750 ppm), 150 ppm of sec-butyl acetate (TLV, 200 ppm) and 100 ppm of methyl ethel ketone (TLV, 200 ppm).

Atmospheric concentration of mixture=400+150+100=650 ppm of mixture.

$$\frac{400}{750}+\frac{150}{200}+\frac{100}{200}=0.53+0.75+0.5=1.78$$

Threshold Limit is exceeded.

2. Special case, when the source of contaminant is a liquid mixture and the atmospheric composition is assumed to be similar to that of the original material, e.g., on a time-weighted average exposure basis, all of the liquid (solvent) mixture eventually evaporates. When the percent composition (by weight) of the liquid mixture is known, the TLV's of the constituents must be listed in mg/m^3. TLV of mixture=

$$\frac{1}{\frac{fa}{TLVa}+\frac{fb}{TLVb}+\frac{fc}{TLVc}+\cdots\frac{fn}{TLVn}}$$

Note: In order to evaluate compliance with this TLV, field sampling instruments should be calibrated in the laboratory for response to this specific quantitative and qualitative air-vapor mixture, and also to fractional concentrations of this mixture, e.g., ½ the TLV; ⅒ the TLV; 2×the TLV; 10×the TLV; etc.).

Example A.2: Liquid contains (by weight):

50% heptane: TLV= 400 ppm or 1600 mg/m^3
1 mg/m^3=0.25 ppm

30% methyl chloroform: TLV= 350 ppm or 1900 mg/m^3
1 mg/m^3=0.18 ppm

20% perchloroethylene: TLV= 50 ppm or 335 mg/m^3
1 mg/m^3=0.15 ppm

$$\text{TLV of Mixture}=\frac{1}{\frac{0.5}{1600}+\frac{0.3}{1900}+\frac{0.2}{335}}=$$

$$\frac{1}{0.00031+0.00016+0.0006}=\frac{1}{0.00107}=935\ \text{mg/m}^3$$

of this mixture:

50% or (935)(0.5)=468 mg/m^3 is heptane
30% or (935)(0.3)=281 mg/m^3 is methyl chloroform
20% or (935)(0.2)=187 mg/m^3 is perchloroethylene

These values can be converted to ppm as follows:

heptane: 468 $\text{mg/m}^3 \times 0.25 = 117$ ppm
methyl chloroform: 281 $\text{mg/m}^3 \times 0.18 = 51$ ppm
perchloroethylene: 187 $\text{mg/m}^3 \times 0.15 = 29$ ppm

TLV of mixture $= 117 + 51 + 29 = 197$ ppm, or 935 mg/m^3

B. Independent effects. TLV for mixture=

$$\frac{C_1}{T_1} = 1; \frac{C_2}{T_2} = 1; \frac{C_3}{T_3} = 1; \text{etc.}$$

Example B.1: Air contains 0.15 mg/m^3 of lead (TLV, 0.15) and 0.7 mg/m^3 of sulfuric acid (TLV, 1).

$$\frac{0.15}{0.15} = 1; \qquad \frac{0.7}{1} = 0.7$$

Threshold limit is not exceeded.

C. TLV for mixtures of mineral dusts. For mixtures of biologically active mineral dusts the general formula for mixtures given in A.2 may be used.

Appendix D

Some Simple Asphyxiants

Acetylene	Argon	Ethane	Ethylene	Helium
Hydrogen	Methane	Neon	Propane	Propylene

Appendix E

Particle Size-Selective Sampling — Criteria for Airborne Particulate Matter

For chemical substances present in inhaled air as suspensions of solid particles or droplets, the potential hazard depends on particle size as well as mass concentration because of

(1) effects of particle size on deposition site within the respiratory tract, and

(2) the tendency for many occupational diseases to be associated with material deposited in particular regions of the respiratory tract.

ACGIH has recommended particle size-selective TLVs for crystalline silica for many years in recognition of the well established association between silicosis and respirable mass concentrations. It now has embarked on a re-examination of other chemical substances encountered in particulate form in occupational environments with the objective of defining

(1) the size-fraction most closely associated for each substance with the health effect of concern, and

(2) the mass concentration within that size fraction which should represent the TLV.

The Particle Size-Selective TLV's (PSS-TLVs) will be expressed in three forms, e.g.

(a) Inspirable Particulate Mass TLVs (IPM-TLVs) for those materials which are hazardous when deposited anywhere in the respiratory tract,

(b) Thoracic Particulate Mass TLVs (TPM-TLVs) for those materials which are hazardous when deposited anywhere within the lung airways and the gas-exchange region,

(c) Respirable Particulate Mass TLVs (RPM-TLVs) for those materials which are hazardous when deposited in the gas-exchange region.

The three particulate mass fractions described above are defined in quantitative terms as follows

(a) Inspirable Particulate Mass consists of those particles that are captured according to the following collection efficiency regardless of sampler orientation with respect to wind direction

$$E = 50(1+\exp[-0.06\, d_a]) \pm 10; \quad 0 < d_a \leq 100\ \mu m$$

collection characteristics for $d_a > 100$ μm are presently unknown, E is collection efficiency in percent, and d_a is aerodynamic diameter in μm,

(b) Thoracic Particulate Mass consists of those particles that penetrate a separator whose size collection efficiency is described by a cumulative lognormal function with a median aerodynamic diameter of 10 μm+1.0 μm and with a geometric standard deviation of 1.5 (±0.1),

(c) Respirable Particulate Mass consists of those particles that penetrate a separator whose size collection efficiency is described by a cumulative lognormal function with a median aerodynamic diameter of 3.5 μm±0.3 μm and with a geometric standard deviation of 1.5 (±0.1). This incorporates and clarifies the previous ACGIH Respirable Dust Sampling Criteria.

These definitions provide a range of acceptable performance for each type of size-selective sampler. Further information is available on the background and performance criteria for these particle size-selective sampling recommendations[1].

References

[1] ACGIH: Particle Size-Selective Sampling in the Workplace, 80 pp. Cincinnati, Ohio (1984).

Dusts

Dusts are also listed in the main alphabetical listing.

Substance	TLV-TWA
SILICA, SiO_2	
Crystalline	
Quartz (i) [14808-60-7]	0.1 mg/m^3, Respirable dust
Cristobalite (i) [14464-46-1]	0.05 mg/m^3, Respirable dust
Silica, fused (i) [60676-86-0]	0.1 mg/m^3, Respirable dust
Tridymite (i) [15468-32-3]	0.05 mg/m^3, Respirable dust
Tripoli (i) [1317-95-9] quartz dust.	0.1 mg/m^3 of contained respirable
Amorphous	
Diatomaceous earth (uncalcined) (e) [68855-54-9]	10 mg/m^3, Total dust
Precipitated silica (e)	10 mg/m^3, Total dust
Silica gel (e)	10 mg/m^3, Total dust
SILICATES	
Asbestos (d)	
Amosite [12172-73-5]	0.5 fiber/cc, A1
Chrysotile [12001-29-5]	2 fibers/cc, A1
Crocidolite	[12001-28-4]0.2 fiber/cc, A1
Other forms	2 fibers/cc, A1
Mica (i) [12001-25-2]	3 mg/m^3, Respirable dust
Mineral wool fiber	10 mg/m^3
Perlite (e)	10 mg/m^3, Total dust
Portland cement (e)	10 mg/m^3, Total dust
Soapstone	3 mg/m^3, Respirable dust (i) 6 mg/m^3, Total dust (e)

SILICATES—*Continued*

Talc (containing no asbestos fibers) (i) [14807-96-6]	2 mg/m^3, Respirable dust
Talc (containing asbestos fibers)	Use asbestos TLV-TWA. However, should not exceed 2 mg/m^3 respirable dust.

OTHER DUSTS

Barium sulfate (e) [7727-43-7]	10 mg/m^3, Total dust
Coal dust (f)	2 mg/m^3, Respirable fraction
Grain dust (oats, wheat, barley)	4 mg/m^3, Total particulate
Graphite (i) (natural) [7782-42-5]	(2.5 mg/m^3, Respirable dust)
Graphite, synthetic (e)	(10 mg/m^3, Total dust)
Nuisance particulates (e)	10 mg/m^3, Total dust

ppm means parts of vapor or gas per million parts of contaminated air by volume at 25 degrees Celsius and 760 torr.

mg/m^3 means milligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.

CAS means Chemical Abstract Series number.

Capital letters A, B, D & E refer to Appendices; C denotes ceiling limit.

** Not ACGIH.

+NOC Not otherwise classified.

o STEL deleted, TWA retained.

(d) Fibers longer than 5 μm and with an aspect ratio equal to or greater than 3:1 as determined by the membrane filter method at 400-450X magnification (4 mm objective) phase contrast illumination.

(e) The value is for total dust containing no asbestos and <1% free silica.

(f) The value is for dust containing <1% free silica. For dust containing more than this percentage of free silica, the environment should be evaluated against the TLV-TWA of 0.1 mg/m^3 for respirable quartz. The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the "c" paragraphs of Appendix E.

(g) Lint-free dust as measured by the vertical elutriator cotton-dust sampler described in the Transactions of the National Conference on Cotton Dust, p. 33, by J.R. Lynch (May 2, 1970).

(h) Total particulate.

(i) The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the "c" paragraphs of Appendix E.

(k) Based on "high volume" sampling.

(l) However, should not exceed 2 mg/m^3 respirable dust.

(m) For control of general room air, biologic monitoring is essential for personnel control.

(n) Does not include stearates of toxic metals.

(o) Except caster, cashew nut, or similar irritating oils.

Radioactivity: See Physical Agents section on Ionizing Radiation.

Table 2-1

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Acetaldehyde [75-07-0]	100	180	150	270
Acetic acid [64-19-7]	10	25	15	37
Acetic anhydride [108-24-7]	C 5	C 20	—	—
Acetone [67-64-1]	750	1,780	1,000	2,375
Acetonitrile [75-05-8] — Skin	40	70	60	105
Acetylene [74-86-2]	D	—	—	—
Acetylene dichloride (see 1,2 — Dichloroethylene)				
Acetylene tetrabromide [79-27-6]	1	15	—	—
Acetylsalicylic Acid (Aspirin) [50-78-2]	—	5	—	—
Acrolein [107-02-8]	0.1	0.25	0.3	0.8
Acrylamide [79-06-1] — Skin	—	0.03, A2	—	—
Acrylic acid [79-10-7]	***2***	***6***	**—**	**—**
Acrylonitrile [107-13-1] — Skin	2, A2	4.5, A2	—	—
Aldrin [309-00-2] — Skin	—	0.25	—	—
Allyl alcohol [107-18-6] — Skin	2	5	4	10
Allyl chloride [107-5-1]	1	3	2	6
Allyl glycidyl ether [106-92-3] (AGE) — Skin	5	22	10	44
Allyl propyl disulfide [2179-59-1]	2	12	3	18
∝-Alumina (See Aluminum Oxide)				

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m^3	ppm	mg/m^3
Aluminum, [7429-90-5]				
As Al				
Metal Dust	—	10	—	—
Pyro powders	—	5	—	—
Welding fumes	—	5	—	—
Soluble salts	—	2	—	—
Alkyls (NOC+)	—	2	—	—
Aluminum oxide [1344-28-1]				
As Al	—	10(e)	—	—
4 Aminodiphenyl [92-67-1]				
— Skin	—	A1	—	—
2-Aminoethanol (see Ethanolamine)				
2 Aminopyridine [504-29-0]	0.5	2	—	—
3-Amino 1,2,4-triazole (see Amitrole)				
Amitrole [61-82-5]	—	0.2	—	—
Ammonia [7664-41-7]	25	18	35	27
Ammonium chloride — fume [12125-02-9]	—	10	—	20
Ammonium perfluorooctonoate [3825-26-1]	—	0.1	—	—
Ammonium sulfamate [7773-06-0]	—	10	—	—
Amosite (see Asbestos)				
n-Amyl acetate [628-63-7]	100	530	—	—
sec-Amyl acetate [626-38-0]	125	665	—	—

Table 2-1 — *Continued*

Substance [CAS #]	Adopted Values TWA ppm	 mg/m³	 STEL ppm	 mg/m³
Aniline [62-53-3] & homologues — Skin	2	10	—	—
Anisidine [29191-52-4] (o-, p-isomers) — Skin	0.1	0.5	—	—
Antimony [7440-36-0] & compounds as Sb	—	0.5	—	—
Antimony trioxide [1309-64-4]				
Handling & use, as Sb	—	0.5	—	—
Production	—	A2	—	—
ANTU [86-88-4]	—	0.3	—	—
Argon [7440-37-1]	D	—	—	—
Arsenic & soluble compounds [7440-38-2] as As	—	0.2	—	—
Arsenic trioxide production [1327-53-3]	—	A2	—	—
Arsine [7784-42-1]	0.05	0.2	—	—
Asbestos (d)				
Amosite [12172-73-5]	0.5 fiber/cc, A1			
Chrysotile [12001-29-5]	***1 fiber/cc, A1***			
Crocidolite [12001-28-4]	0.2 fiber/cc, A1			
Other forms	***1 fiber/cc, A1***			
Where the type of fiber has not been identified, the TLV shall be	0.2 fibers/cc, A1**			
Asphalt (petroleum) fumes [8052-42-4]	—	5	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m^3	ppm	mg/m^3
Atrazine [1912-24-9]	—	5	—	—
Azinphos-methyl [86-50-0] — Skin	—	0.2	—	—
Barium [7440-39-3] soluble compounds, as Ba	—	0.5	—	—
Barium sulfate [7727-43-7]	—	10(e)	—	—
Benomyl [17804-35-2]	0.8	10	—	—
Benzene [71-43-2]	10, A2	30, A2	—	—
Benzidine [92-87-5] — Skin	—	A1	—	—
p-Benzoquinone (see Quinone)				
Benzoyl peroxide [94-36-0]	—	5	—	—
Benzo(a)pyrene [50-32-8]	—	A2	—	—
Benzyl chloride [100-44-7]	1	5	—	—
Beryllium and compounds [7440-41-7]	—	0.002, A2	—	—
o-Biphenyl [92-52-4]	0.2	1.5	—	—
Bismuth telluride [1304-82-1]	—	10	—	—
Se-doped	—	5	—	—
Borates, tetra, sodium salts [1303-96-4]				
Anhydrous	—	1	—	—
Decahydrate	—	5	—	—
Pentahydrate	—	1	—	—
Boron oxide [1303-86-2]	—	10	—	—
Boron tribromide [10294-33-4]	C1	C10	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m^3	ppm	mg/m^3
Boron trifluoride [7637-07-2]	C1	C3	—	—
Bromacil [314-40-9]	1	10	—	—
Bromine [7726-95-6]	0.1	0.7	0.3	2
Bromine pentafluoride [7789-30-2]	0.1	0.7	—	—
Bromochloromethane (see Chlorobromomethane)				
Bromoform [75-25-2] — Skin	0.5	5	—	—
1,3-Butadiene [106-99-0]	10, A2	22, A2	—	—
Butane [106-97-8]	800	1,900	—	—
Butanethiol (see Butyl mercaptan)				
2-Butanone (see Methyl ethyl ketone) [MEK])				
2-Butoxyethanol [111-76-2] — Skin	25	120	—	—
n-Butyl acetate [123-86-4]	150	710	200	950
sec-Butyl acetate [105-46-4]	200	950	—	—
tert-Butyl acetate [540-88-5]	200	950	—	—
Butyl acrylate [141-32-2]	10	55	—	—
n-Butyl alcohol [71-36-3] — Skin	C50	C150	—	—
sec-Butyl alcohol [78-92-2]	***100***	***305***	—	—
tert-Butyl alcohol [75-65-0]	100	300	150	450
Butylamine [109-73-9] — Skin	C5	C15	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m³	ppm	mg/m³
tert-Butyl chromate, [1189-85-1] as CrO_3 — Skin	—	C0.1	—	—
n-Butyl glycidyl ether [2426-08-6] (BGE)	25	135	—	—
n-Butyl lactate [138-22-7]	5	25	—	—
Butyl mercaptan [109-79-5]	0.5	1.5	—	—
o-sec-Butylphenol [89-72-5] — Skin	5	30	—	—
p-tert-Butyltoluene [98-51-1]	10	60	20	120
Cadmium [7440-43-9] Dusts & salts, as Cd	—	(0.05)	—	—
Cadmium oxide [1306-19-0]				
Fume, as Cd	—	(C0.05)	—	—
Production	—	(0.05)	—	—
Calcium carbonate [1317-65-3]	—	10(e)	—	—
Calcium cyanamide [156-62-7]	—	0.5	—	—
Calcium hydroxide [1305-62-0]	—	5	—	—
Calcium oxide [1305-78-8]	—	2	—	—
Calcium silicate [1344-95-2]	—	10(e)	—	—
Calcium sulfate [7778-18-9]	—	10(e)	—	—
Camphor, synthetic [76-22-2]	2	12	3	18

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Caprolactam [105-60-2]				
Dust	—	(1)	—	(3)
Vapor	(5)	(20)	(10)	(40)
Captafol — Skin [2425-06-1]	—	0.1	—	—
Captan [133-06-2]	—	5	—	—
Carbaryl [63-25-2]	—	5	—	—
Carbofuran [1563-66-2]	—	0.1	—	—
Carbon black [1333-86-4]	—	3.5	—	—
Carbon dioxide [124-38-9]	5,000	9,000	30,000	54,000
Carbon disulfide [75-15-0] — Skin	10	30	—	—
Carbon monoxide [630-08-0]	50	55	400	440
Carbon tetrabromide [558-13-4]	0.1	1.4	0.3	4
Carbon tetrachloride [56-23-5] — Skin	5, A2	30, A2	—	—
Carbonyl chloride, (see Phosgene)				
Carbonyl fluoride [353-50-4]	2	5	5	15
Catechol [120-80-9]	5	20	—	—
Cellulose (paper fiber) [9004-34-6]	—	10(e)	—	—
Cesium hydroxide [21351-79-1]	—	2	—	—
Chlordane — Skin [57-74-9]	—	0.5	—	(2)
Chlorinated camphene [8001-35-2] — Skin	—	0.5	—	1

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m³	ppm	mg/m³
Chlorinated diphenyl-oxide [55720-99-5]	—	0.5	—	(2)
Chlorine [7782-50-5]	***0.5***	***1.5***	***1***	***3***
Chlorine dioxide [10049-04-4]	0.1	0.3	0.3	0.9
Chlorine trifluoride [7790-91-2]	C0.1	C0.4	—	—
Chloroacetaldehyde [107-20-0]	C1	C3	—	—
Chloroacetone [78-95-5] — Skin	***C1***	***C4***	—	—
-Chloroacetophenone [532-27-4]	0.05	0.3	—	—
Chloroacetyl chloride [79-04-9]	***0.05***	***0.2***	***0.15***	***0.6***
Chlorobenzene [108-90-7]	***10***	***46***	—	—
o-Chlorobenzylidene malononitrile [2698-41-1] — Skin	C0.05	C0.4	—	—
Chlorobromomethane [74-97-5]	***200***	***1,050***	—	—
2-Chloro-1,3-butadiene (see β-Chloroprene)				
Chlorodifluoromethane [75-45-6]	***1,000***	***3,500***	—	—
Chlorodiphenyl (42% Chlorine) [53469-21-9] — Skin	—	***1***	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m³	ppm	mg/m³
Chlorodiphenyl. (54% Chlorine) [11097-69-1] — Skin	—	***0.5***	—	—
1-Chloro,2,3-epoxy-propane (see Epichlorohydrin)				
2-Chloroethanol (see Ethylene chlorohydrin)				
Chloroethylene (see Vinyl chloride)				
Chloroform [67-66-3]	10, A2	50, A2	—	—
bis(Chloromethyl) ether [542-88-1]	0.001, A1	0.005, A1	—	—
Chloromethyl methyl ether [107-30-2]	A2	A2	—	—
1-Chloro-1-nitropropane-[600-25-9]	2	10	—	—
Chloropentafluoroethane [76-15-3]	1,000	6,320	—	—
Chloropicrin [76-06-2]	***0.1***	***0.7***	—	—
β-Chloroprene [126-99-8] — Skin	10	35	—	—
2-Chloropropionic Acid — Skin	***0.1***	***0.44***	—	—
o-Chlorostyrene [2039-87-4]	50	285	75	430
o-Chlorotoluene [95-49-8]	***50***	***250***	—	—
2-Chloro-6-(trichloromethyl) pyridine (see Nitrapyrin)				

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Chlorpyrifos — Skin [2921-88-2]	**—**	***0.2***	**—**	**—**
Chromite ore processing (Chromate), as Cr	—	0.05, A1	—	—
Chromium [7440-47-3]				
Metal	—	0.5	—	—
Chromium (II) — compounds, as Cr	—	0.5	—	—
Chromium (III) compounds, as Cr	—	0.5	—	—
Chromium (VI) — compounds, as Cr				
Water soluble	—	0.05	—	—
Certain water insoluble	—	0.05, A1	—	—
Chromyl chloride [14977-61-8]	0.025	0.15	—	—
Chrysene [218-01-9]	A2	A2	—	—
Chrysotile (see Asbestos)				
Clopidol [2971-90-6]	**—**	***10***	**—**	**—**
Coal dust	—	2,(f) Respirable fraction		
Coal tar pitch volatiles [65996-93-2] as benzene solubles	—	0.2, A1	—	—
Cobalt [7440-48-4], as Co Metal dust & fume	—	0.05	—	—
Cobalt carbonyl [10210-68-1] as Co	—	0.1	—	—
Cobalt hydrocarbonyl [16842-03-8] as Co	—	0.1	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Copper [7440-50-8]				
Fume	—	0.2	—	—
Dusts & mists, as Cu	—	1	—	—
Cotton dust, raw	—	0.2(g)	—	—
Cresol, all isomers [1319-77-3] — Skin	5	22	—	—
Cristobalite (see Silica-Crystaline)				
Crocidolite (see Asbestos)				
Crotonaldehyde [4170-30-3]	2	6	—	—
Crufomate [299-86-5]	—	5	—	(20)
Cumene [98-82-8] — Skin	50	245	—	—
Cyanamide [420-04-2]	—	2	—	—
Cyanides, as CN [151-50-8;143-33-9] — Skin	—	5	—	—
Cyanogen [460-19-5]	10	20	—	—
Cyanogen chloride [506-77-4]	C0.3	C0.6	—	—
Cyclohexane [110-82-7]	300	1,050	—	—
Cyclohexanol [108-93-0] — Skin	50	200	—	—
Cyclohexanone [108-94-1] — Skin	25	100	—	—
Cyclohexene [110-83-8]	300	1,015	—	—
Cyclohexylamine [108-91-8]	10	40	—	—
Cyclonite [121-82-4] — Skin	***—***	***1.5***	***—***	***—***
Cyclopentadiene [542-92-7]	75	200	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Cyclopentane [287-92-3]	600	1,720	—	—
Cyhexatin [13121-70-5]	—	5	—	—
2,4-D [94-75-7]	—	10	—	—
DDT [50-29-3] (Dichlorodiphenyltrichloroethane)	—	1	—	—
Decaborane [17702-41-9] — Skin	0.05	0.3	0.15	0.9
Demeton [8065-48-3] — Skin	0.01	0.1	—	—
Diacetone alcohol [123-42-2]	50	240	—	—
1,2-Diaminoethane (see Ethylenediamine)				
Diatomaceous earth (see Silica-Amorphous)				
Diazinon [333-41-5] — Skin	—	0.1	—	—
Diazomethane [334-88-3]	0.2	0.4	—	—
Diborane [19287-45-7]	0.1	0.1	—	—
1,2-Dibromoethane (see Ethylene dibromide)				
2-N-Dibutylaminoethanol [102-81-8] — Skin	2	14	—	—
Dibutyl phenyl phosphate — Skin	***0.3***	***3.5***	**—**	**—**
Dibutyl phosphate [107-66-4]	***1***	***8.6***	***2***	***17***
Dibutyl phthalate [84-74-2]	—	5	—	—
Dichloroacetylene [7572-29-4]	C0.1	C0.4	—	—
o-Dichlorobenzene [95-50-1]	C50	C300	—	—

Table 2-1 — *Continued*

Substance [CAS #]	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³
	Adopted Values			
p-Dichlorobenzene [106-46-7]	75	450	110	675
3,3'-Dichlorobenzidine [91-94-1] — Skin	—	A2	—	—
Dichlorodifluoromethane [75-71-8]	1,000	4,950	—	—
1,3-Dichloro-5,5-dimethyl hydantoin [118-52-5]	—	0.2	—	0.4
1,1-Dichloroethane [75-34-3]	200	810	250	1,010
1,2-Dichloroethane (see Ethylene dichloride)				
1,1-Dichloroethylene (see Vinylidene chloride)				
1,2-Dichloroethylene [540-59-0]	200	790	—	—
Dichloroethyl ether [111-44-4] — Skin	5	30	10	60
Dichlorofluoromethane [75-43-4]	10	40	—	—
Dichloromethane (see Methylene chloride)				
1,1-Dichloro-1-nitroethane [594-72-9]	2	10	—	—
1,2-Dichloropropane (see Propylene dichloride)				
Dichloropropene [542-75-6] — Skin	1	5	—	—
2,2-Dichloropropionic acid [75-99-0]	1	6	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
Dichlorotetrafluoroethane [76-14-2]	1,000	7,000	—	—
Dichlorvos [62-73-7] — Skin	0.1	1	—	—
Dicrotophos [141-66-2] — Skin	—	0.25	—	—
Dicyclopentadiene [77-73-6]	5	30	—	—
Dicyclopentadienyl iron [102-54-5]	—	10	—	—
Dieldrin [60-57-1]- Skin	—	0.25	—	—
Diethanolamine [111-42-2]	3	15	—	—
Diethylamine [109-89-7]	10	30	25	75
2-Diethylaminoethanol [100-37-8] — Skin	10	50	—	—
Diethylene triamine [111-40-0] — Skin	1	4	—	—
Diethyl ether (see Ethyl ether)				
Di(2-ethylhexy)phthalate (see Di-sec-octyl phthalate)				
Diethyl ketone [96-22-0]	200	705	—	—
Diethyl phthalate [84-66-2]	—	5	—	—
Difluorodibromomethane [75-61-6]	100	860	—	—
Diglycidyl ether (DGE) [2238-07-5]	0.1	0.5	—	—
Dihydroxybenzene (see Hydroquinone)				
Diisobutyl ketone [108-83-8]	25	150	—	—
Diisopropylamine [108-18-9] — Skin	5	20	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
Dimethoxymethane (see Methylal)				
Dimethyl acetamide [127-19-5] — Skin	10	35	—	—
Dimethylamine [124-40-3]	10	18	—	—
Dimethylaminobenzene (see Xylidene)				
Dimethylaniline [121-69-7] (N,N-Dimethylaniline) — Skin	5	25	10	50
Dimethylbenzene (see Xylene)				
Dimethyl carbamoyl chloride [79-44-7]	A2	A2	—	—
Dimethyl-1,2-dibromo-2-dichloroethyl phosphate (see Naled)				
Dimethylformamide [68-12-2] — Skin	10	30	—	—
2,6-Dimethyl-4-heptanone (see Diisobutyl ketone)				
1,1-Dimethylhydrazine [57-14-7] — Skin	0.5, A2	1, A2	—	—
Dimethylnitrosoamine (see N-Nitrosodimethylamine)				
Dimethylphthalate [131-11-3]	—	5	—	—
Dimethyl sulfate [77-78-1] — Skin	0.1, A2	0.5, A2	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		**STEL**	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Dinitolmide [148-01-6]	—	5	—	—
Dinitrobenzene (all isomers) [528-29-0; 99-65-0; 100-25-4] — Skin	0.15	1	—	—
Dinitro-o-cresol [534-52-1] — Skin	—	0.2	—	—
3,5-Dinitro-o-toluamide (see Dinitolmide)				
Dinitrotoluene [121-14-2] — Skin	—	1.5	—	—
Dioxane [123-91-1] — Skin	25	90	—	—
Dioxathion [78-34-2]	—	0.2	—	—
Diphenyl (see Biphenyl)				
Diphenylamine [122-39-4]	—	10	—	—
Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate)				
Dipropylene glycol methyl ether [34590-94-8] — Skin	100	600	150	900
Dipropyl ketone [123-19-3]	50	235	—	—
Diquat [85-00-7]	—	0.5	—	—
Di-sec-octyl phthalate [117-81-7]	—	5	—	10
Disulfiram [97-77-8]	—	2	—	—
Disulfoton [298-04-4]	—	0.1	—	—
2,6-Di-tert-butyl-p-cresol [128-37-0]	—	10	—	—
Diuron [330-54-1]	—	10	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Divinyl benzene [1321-74-0]	10	50	—	—
Emery [112-62-9]	—	10(e)	—	—
Endosulfan [115-29-7] — Skin	—	0.1	—	—
Endrin [72-20-8] — Skin	—	0.1	—	—
Enflurane [13838-16-9]	75	575	—	—
Enzymes (see Subtilisins)				
Epichlorohydrin [106-89-8] — Skin	2	10	—	—
EPN — Skin [2104-64-5]	—	0.5	—	—
1,2-Epoxypropane (see Propylene oxide)				
2,3-Epoxy-1-propanol (see Glycidol)				
Ethane [74-84-0]	D	—	—	—
Ethanethiol (see Ethyl mercaptan)				
Ethanol (see Ethyl alcohol)				
Ethanolamine [141-43-5]	3	8	6	15
Ethion [563-12-2] — Skin	—	0.4	—	—
2-Ethoxyethanol [110-80-5] — Skin	5	19	—	—
2-Ethoxyethyl acetate [111-15-9] — Skin	5	27	—	—
Ethyl acetate [141-78-6]	400	1,400	—	—
Ethyl acrylate [140-88-5]	***A2***	***A2***	***15,A2***	***61,A2***
Ethyl alcohol [64-17-5]	1,000	1,900	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m³	ppm	mg/m³
Ethylamine [75-04-7]	10	18	—	—
Ethyl amyl ketone [541-85-5]	25	130	—	—
Ethyl benzene [100-41-4]	100	435	125	545
Ethyl bromide [74-96-4]	200	890	250	1,110
Ethyl butyl ketone [106-35-4]	50	230	—	—
Ethyl chloride [75-00-3]	1,000	2,600	—	—
Ethylene [74-85-1]	D	—	—	—
Ethylene chlorohydrin [107-07-3] — Skin	C1	C3	—	—
Ethylenediamine [107-15-3]	10	25	—	—
Ethylene dibromide [106-93-4] — Skin	A2	A2	—	—
Ethylene dichloride [107-06-2]	10	40	—	—
Ethylene glycol Vapor [107-21-1]	C50	C125	—	—
Ethylene glycol dinitrate [628-96-6] — Skin	0.05	0.3	—	—
Ethylene glycol methyl ether acetate (see 2-Methoxyethyl acetate)				
Ethylene oxide [75-21-8]	1, A2	2, A2		
Ethylenimine [151-56-4] — Skin	0.5	1	—	—
Ethyl ether [60-29-7]	400	1,200	500	1,500
Ethyl formate [109-94-4]	100	300	—	—
Ethylidene chloride (see 1,1-Dichloroethane)				

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Ethylidene norbornene [16219-75-3]	C5	C25	—	—
Ethyl mercaptan [75-08-1]	0.5	1	—	—
N-Ethylmorpholine [100-74-3]- Skin	5	23	—	—
Ethyl silicate [78-10-4]	10	85	—	—
Fenamiphos [22224-92-6] — Skin	—	0.1	—	—
Fensulfothion [115-90-2]	—	0.1	—	—
Fenthion [55-38-9] — Skin	—	0.2	—	—
Ferbam [14484-64-1]	—	10	—	—
Ferrovanadium dust [12604-58-9]	—	1	—	3
Fibrous glass dust	—	10	—	—
Fluorides, as F	—	2.5	—	—
Fluorine [7782-41-4]	1	2	2	4
Fluorotrichloromethane (see Trichlorofluoromethane)				
Fonofos [944-22-9] — Skin	—	0.1	—	—
Formaldehyde [50-00-0]	1, A2	1.5, A2	2, A2	3, A2
Formamide [75-12-7] — Skin	10	15	—	—
Formic acid [64-18-6]	***5***	***9***	***10***	***19***
Furfural [98-01-1] — Skin	2	8	—	—
Furfuryl alcohol [98-00-0] — Skin	10	40	15	60
Gasoline [8006-61-9]	300	900	500	1,500
Germanium tetrahydride [7782-65-2]	0.2	0.6	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m³	ppm	mg/m³
Glass, fibrous or dust (see Fibrous glass dust)				
Glutaraldehyde [111-30-8]	C0.2	C0.7	—	—
Glycerin mist [56-81-5]	—	10(e)	—	—
Glycidol [556-52-5]	25	75	—	—
Glycol monoethyl ether (See 2-Ethoxyethanol)				
Grain dust (oat, wheat, barley)	—	4(h)	—	—
Graphite (all forms except graphite fibres) [7782-42-5]	—	***(2(i)), Respirable dust***		
Gypsum (see Calcium sulfate)				
Hafnium [7440-58-6]	—	0.5	—	—
Halothane [151-67-7]	50	400	—	—
Helium [7440-59-7]	D	—	—	—
Heptachlor [76-44-8] — Skin	—	0.5	—	—
Heptane (n-Heptane) [142-82-5]	400	1,600	500	2,000
2-Heptanone (see Methyl n-amyl ketone)				
3-Heptanone (see Ethyl butyl ketone)				
Hexachlorobutadiene [87-68-3] — Skin	0.02, A2	0.24, A2	—	—
Hexachlorocyclopentadiene [77-47-4]	0.01	0.1	—	—
Hexachloroethane [67-72-1]	***(1)***	***(9.7)***	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
Hexachloronaphthalene [1335-87-1] — Skin	—	0.2	—	—
Hexafluoroacetone [684-16-2] — Skin	0.1	0.7	—	—
Hexamethylene diisocyanate [822-06-0]	0.005	0.035	—	—
Hexamethyl phosphoramide [680-31-9] — Skin	A2	A2	—	—
Hexane (n-Hexane) [110-54-3]	50	180	—	—
Other isomers	500	1,800	1,000	3,600
2-Hexanone (see Methyl n-butyl ketone)				
Hexone (see Methyl isobutyl ketone)				
sec-Hexyl acetate [108-84-9]	50	300	—	—
Hexylene glycol [107-41-5]	C25	C125	—	—
Hydrazine [302-01-2] — Skin	0.1, A2	0.1, A2	—	—
Hydrogen [1333-74-0]	D	—	—	—
Hydrogenated terphenyls [61788-32-7]	0.5	5	—	—
Hydrogen bromide [10035-10-6]	C3	C10	—	—
Hydrogen chloride [7647-01-0]	C5	C7	—	—
Hydrogen cyanide [74-90-8] — Skin	C10	C10	—	—
Hydrogen fluoride, as F [7664-39-3]	C3	C2.5	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Hydrogen peroxide [7722-84-1]	1	1.5	—	—
Hydrogen selenide [7783-07-5] as Se	0.05	0.2	—	—
Hydrogen sulfide [7783-06-4]	10	14	15	21
Hydroquinone [123-31-9]	—	2	—	—
4-Hydroxy-4-methyl-2-pentanone, (see Diacetone alcohol)				
2-Hydroxypropyl [999-61-1] acrylate — Skin	0.5	3	—	—
Indene [95-13-6]	10	45	—	—
Indium [7440-74-6] & compounds as In	—	0.1	—	—
Iodine [7553-56-2]	C0.1	C1	—	—
Iodoform [75-47-8]	0.6	10	—	—
Iron oxide fume (Fe_2O_3) [1309-37-1] as Fe	B2	5	—	—
Iron pentacarbonyl [13463-40-6] as Fe	***0.1***	***0.23***	***0.2***	***0.45***
Iron salts, soluble, as Fe	—	1	—	—
Isoamyl acetate [123-92-2]	100	525	—	—
Isoamyl alcohol [123-51-3]	100	360	125	450
Isobutyl acetate [110-19-0]	***150***	***700***	**—**	**—**
Isobutyl alcohol [78-83-1]	50	150	—	—
Isooctyl alcohol [26952-21-6] — Skin	50	270	—	—
Isophorone [78-59-1]	C5	C25	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m³	ppm	mg/m³
Isophorone diisocyanate [4098-71-9] — Skin	0.005	0.045	—	—
Isopropoxyethanol [109-59-1]	25	105	—	—
Isopropyl acetate [108-21-4]	250	950	310	1,185
Isopropyl alcohol [67-63-0]	400	980	500	1,225
Isopropylamine [75-31-0]	5	12	10	24
N-Isopropylaniline [768-52-5] — Skin	2	10	—	—
Isopropyl ether [108-20-3]	250	1,050	310	1,320
Isopropyl glycidyl ether (IGE) [4016-14-2]	50	240	75	360
Kaolin	—	10(e)	—	—
Ketene [463-51-4]	0.5	0.9	1.5	3
Lead [7439-92-1] inorg. dusts and fumes, as Pb	—	0.15	—	—
Lead arsenate [3687-31-8] as $Pb_3(As0_4)_2$	—	0.15	—	—
Lead chromate [7758-97-6] as Cr	—	0.05, A2	—	—
Limestone (see Calcium carbonate)				
Lindane [58-89-9] — Skin	—	0.5	—	—
Lithium hydride [7580-67-8]	—	0.025	—	—
L.P.G. [68476-85-7] (Liquified petroleum gas)	1,000	1,800	—	—
Magnesite [546-93-0]	—	10(e)	—	—
Magnesium oxide fume [1309-48-4]	—	10	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m^3	ppm	mg/m^3
Malathion [121-75-5] — Skin	—	10	—	—
Maleic anhydride [108-31-6]	0.25	1	—	—
Manganese [7439-96-5], as Mn				
Dust & compounds	—	5	—	—
Fume	—	1	—	3
Manganese cyclopentadienyl tricarbonyl [12079-65-1] as Mn — Skin	—	0.1	—	—
Marble (see Calcium carbonate)				
Mercury, [7439-97-6] as Hg — Skin				
Alkyl compounds	—	0.01	—	0.03
All forms except alkyl, Vapor	—	0.05	—	—
Aryl & inorganic compounds	—	0.1	—	—
Mesityl oxide [141-79-7]	15	60	25	100
Methacrylic acid [79-41-4]	20	70	—	—
Methane [74-82-8]	D	—	—	—
Methanethiol (see Methyl mercaptan)				
Methanol (see Methyl alcohol)				
Methomyl [16752-77-5]	—	2.5	—	—
Methoxychlor [72-43-5]	—	10	—	—
2-Methoxyethanol [109-86-4] — Skin	5	16	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
2-Methoxyethyl acetate [110-49-6] — Skin	5	24	—	—
4-Methoxyphenol [150-76-5]	—	5	—	—
Methyl acetate [79-20-9]	200	610	250	760
Methyl acetylene [74-99-7]	***1,000***	***1,650***	—	—
Methyl acetylene-propadiene mixture (MAPP)	1,000	1,800	1,250	2,250
Methyl acrylate [96-33-3] — Skin	10	35	—	—
Methylacrylonitrile [126-98-7] — Skin	1	3	—	—
Methylal [109-87-5]	1,000	3,100	—	—
Methyl alcohol — Skin [67-56-1]	200	260	250	310
Methylamine [74-89-5]	10	12	—	—
Methyl amyl alcohol (see Methyl isobutyl carbinol)				
Methyl n-amyl ketone [110-43-0]	50	235	—	—
N-Methyl aniline [100-61-8] — Skin	0.5	2	—	—
Methyl bromide [74-83-9] — Skin	5	20	—	—
Methyl n-butyl ketone [591-78-6]	5	20	—	—
Methyl chloride [74-87-3]	50	105	100	205
Methyl chloroform [71-55-6]	350	1,900	450	2,450
Methyl 2-cyanoacrylate [137-05-3]	2	8	4	16

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Methylcyclohexane [108-87-2]	400	1,600	—	—
Methylcyclohexanol [25639-42-3]	50	235	—	—
O-Methylcyclohexanone [583-60-8] — Skin	50	230	75	345
2-Methylcyclopentadienyl manganese tricarbonyl [12108-13-3] as Mn — Skin	—	0.2	—	—
Methyl demeton [8022-00-2] — Skin	—	0.5	—	—
Methylene bisphenyl isocyanate (MDI) [101-68-8]	0.005	0.055	—	—
Methylene chloride [75-09-2]	50, A2	175.A2	—	—
4,4'-Methylene bis (2-chloroaniline) [101-14-4] — Skin	0.02, A2	0.22, A2	—	—
Methylene bis (4-cyclohexylisocyanate) [5124-30-1]	0.005	0.055	—	—
4,4'-Methylene dianiline [101-77-9] — Skin	0.1, A2	0.8, A2	—	—
Methyl ethyl ketone [78-93-3] (MEK)	200	590	300	885
Methyl ethyl ketone peroxide [1338-23-4]	C0.2	C1.5	—	—
Methyl formate [107-31-3]	100	250	150	375

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
5-Methyl-3-heptanone (see Ethyl amyl ketone)				
Methyl hydrazine [60-34-4] — Skin	C0.2, A2	C0.35, A2	—	—
Methyl iodide [74-88-4] — Skin	2, A2	10, A2	—	—
Methyl isoamyl ketone [110-12-3]	50	240	—	—
Methyl isobutyl carbinol [108-11-2] — Skin	25	100	40	165
Methyl isobutyl ketone [108-10-1]	50	205	75	300
Methyl isocyanate [624-83-9] — Skin	0.02	0.05	—	—
Methyl isopropyl ketone [563-80-4]	200	705	—	—
Methyl mercaptan [74-93-1]	0.5	1	—	—
Methyl methacrylate [80-62-6]	100	410	—	—
Methyl parathion [298-00-0] — Skin	—	0.2	—	—
Methyl propyl ketone [107-87-9]	200	700	250	875
Methyl silicate [681-84-5]	1	6	—	—
∝-Methyl styrene [98-83-9]	50	240	100	485
Metribuzin [21087-64-9]	—	5	—	—
Mevinphos [7786-34-7] — Skin	0.01	0.1	0.03	0.3

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Mica [12001-25-2]	—	3,(i) Respirable dust		
Mineral wool fiber	—	10(e)	—	—
Molybdenum [7439-98-7] as Mo				
Soluble compounds	—	5	—	—
Insoluble compounds	—	10	—	—
Monochlorobenzene (see Chlorobenzene)				
Monocrotophos [6923-22-4]	—	0.25	—	—
Morpholine — Skin [110-91-8]	***20***	***70***	**—**	**—**
Naled — Skin [300-76-5]	—	3	—	—
Naphthalene [91-20-3]	10	50	15	75
β-Naphthylamine [91-59-8]	—	A1	—	—
Neon [7440-01-9]	D	—	—	—
Nickel [7440-02-0]				
Metal	—	1	—	—
Insoluble compounds, as Ni	**—**	***1***	**—**	**—**
Soluble compounds, as Ni	—	0.1	—	—
Nickel carbonyl, as Ni [13463-39-3]	0.05	0.1	—	—
Nickel sulfide roasting, fume & dust, as Ni	—	1,A1	—	—
Nicotine [54-11-5] — Skin	—	0.5	—	—
Nitrapyrin [1929-82-4]	—	10	—	20

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Nitric acid [7697-37-2]	2	5	4	10
Nitric oxide [10102-43-9]	25	30	—	—
p-Nitroaniline [100-01-6] — Skin	—	3	—	—
Nitrobenzene [98-95-3] — Skin	1	5	—	—
p-Nitrochlorobenzene [100-00-5] — Skin	0.1	0.6	—	—
4-Nitrodiphenyl [92-93-3]	—	A1	—	—
Nitroethane [79-24-3]	100	310	—	—
Nitrogen [7727-37-9]	***D***	—	—	—
Nitrogen dioxide [10102-44-0]	3	6	5	10
Nitrogen trifluoride [7783-54-2]	10	30	—	—
Nitroglycerin (NG) [55-63-0] — Skin	0.05	0.5	—	—
Nitromethane [75-52-5]	100	250	—	—
1-Nitropropane [108-03-2]	25	90	—	—
2-Nitropropane [79-46-9]	C10, A2	C35, A2	—	—
N-Nitrosodimethylamine [62-75-9] — Skin	—	A2	—	—
Nitrotoluene — Skin [88-72-2; 99-08-1; 99-99-0]	2	11	—	—
Nitrotrichloromethane (see Chloropicrin)				
Nitrous oxide [10024-97-2]	***50***	***90***	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		**STEL**	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Nonane [111-84-2]	200	1,050	—	—
Nuisance particulates	—	10(e)	—	—
Octachloronaphthalene [2234-13-1] — Skin	—	0.1	—	0.3
Octane [111-65-9]	300	1,450	375	1,800
Oil mist, mineral [8012-95-1]	—	5(i)	—	10
Osmium tetroxide [20816-12-0], as Os	0.0002	0.002	0.0006	0.006
Oxalic acid [144-62-7]	—	1	—	2
Oxygen difluoride [7783-41-7]	C0.05	C0.1	—	—
Ozone [10028-15-6]	***C(0.1)***	***C(0.2)***	**—**	**—**
Paraffin wax fume [8002-74-2]	—	2	—	—
Paraquat [4685-14-7]				
total dust	**—**	***0.5***	**—**	**—**
respirable sizes	—	0.1	—	—
Parathion [56-38-2] — Skin	—	0.1	—	—
Particulate polycyclic aromatic hydrocarbons (PPAH), (see Coal tar pitch volatiles)				
Pentaborane [19624-22-7]	0.005	0.01	0.015	0.03
Pentachloronaphthalene [1321-64-8]	—	0.5	—	—
Pentachloronitrobenzene [82-68-8]	**—**	***0.5***	**—**	**—**
Pentachlorophenol [87-86-5], Skin	—	0.5	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m³	ppm	mg/m³
Pentaerythritol [115-77-5]	—	10(e)	—	—
Pentane [109-66-0]	600	1,800	750	2,250
2-Pentanone (see Methyl propyl ketone)				
Perchloroethylene [127-18-4]	50	335	200	1,340
Perchloromethyl mercaptan [594-42-3]	0.1	0.8	—	—
Perchloryl fluoride [7616-94-6]	3	14	6	28
Precipitated silica (see Silica — Amorphous)				
Perlite	—	10(e)	—	—
Petroleum distillates, (see Gasoline; Mineral Spirits; Stoddard Solvent; VM & P naphtha)				
Phenacyl chloride, (see ∝ Chloroacetophenone)				
Phenol — Skin [108-95-2]	5	19	—	—
Phenothiazine [92-84-2], Skin	—	5	—	—
N-Phenyl-beta-naphthylamine [135-88-6]	A2	A2	—	—
m-Phenylenediamine [108-45-2]	—	***0.1***	—	—
o-Phenylenediamine [95-54-5]	—	***0.1,A2***	—	—
p-Phenylene diamine [106-50-3] — Skin	—	0.1	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		**STEL**	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Phenyl ether [101-84-8] vapor	1	7	2	14
Phenylethylene (see Styrene, monomer)				
Phenyl glycidyl ether [122-60-1] (PGE)	1	6	—	—
Phenylhydrazine [100-63-0] — Skin	***0.1,A2***	***0.44,A2***	—	—
Phenyl mercaptan [108-98-5]	0.5	2	—	—
Phenylphosphine [638-21-1]	C0.05	C0.25	—	—
Phorate [298-02-2] — Skin	—	0.05	—	0.2
Phosdrin (see Mevinphos)				
Phosgene [75-44-5]	0.1	0.4	—	—
Phosphine [7803-51-2]	0.3	0.4	1	1
Phosphoric acid [7664-38-2]	—	1	—	3
Phosphorus (yellow) [7723-14-0]	***0.02***	***0.1***	—	—
Phosphorus oxychloride [10025-87-3]	***0.1***	***0.6***	—	—
Phosphorus pentachloride [10026-13-8]	0.1	1	—	—
Phosphorus pentasulfide [1314-80-3]	—	1	—	3
Phosphorus trichloride [7719-12-2]	0.2	1.5	0.5	3
Phthalic anhydride [85-44-9]	1	6	—	—
m-Phthalodinitrile [626-17-5]	—	5	—	—
Picloram [1918-02-1]	—	***10***	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
Picric acid [88-89-1] Skin	—	0.1	—	(0.3)
Pindone [83-26-1]	—	0.1	—	—
Piperazine dihydrochloride [142-64-3]	—	5	—	—
2-Pivalyl-1,3-indandione (see Pindone)				
Plaster of Paris (see Calcium sulfate)				
Platinum [7440-06-4]				
Metal	—	1	—	—
Soluble salts, as Pt	—	0.002	—	—
Polychlorobiphenyls (see Chlorodiphenyls)				
Polytetrafluoroethylene decomposition products	—	B1	—	—
Portland cement	—	10(e)	—	—
Potassium hydroxide [1310-58-3]	—	C2	—	—
Propane [74-98-6]	D	—	—	—
Propane sultone [1120-71-4]	A2	A2	—	—
Propargyl alcohol [107-19-7] — Skin	1	2	—	—
β-Propiolactone [57-57-8]	0.5, A2	1.5, A2	—	—
Propionic acid [79-09-4]	***10***	***30***	**—**	**—**
Propoxur [114-26-1]	—	0.5	—	—
n-Propyl acetate [109-60-4]	200	840	250	1,050
Propyl alcohol [71-23-8] — Skin	200	500	250	625

Table 2-1 — *Continued*

	Adopted Values			
	TWA		**STEL**	
Substance [CAS #]	**ppm**	**mg/m^3**	**ppm**	**mg/m^3**
Propylene [115-07-1]	D	—	—	—
Propylene dichloride [78-87-5]	75	350	110	510
Propylene glycol dinitrate [6423-43-4] — Skin	0.05	0.3	—	—
Propylene glycol monomethyl ether [107-98-2]	100	360	150	540
Propylene imine [75-55-8] — Skin	2, A2	5, A2	—	—
Propylene oxide [75-56-9]	20	50	—	—
n-Propyl nitrate [627-13-4]	25	105	40	170
Propyne (see Methyl acetylene)				
Pyrethrum [8003-34-7]	—	5	—	—
Pyridine [110-86-1]	5	15	—	—
Pyrocatechol (see Catechol)				
Quartz (see Silica — Crystaline)				
Quinone [106-51-4]	0.1	0.4	—	—
RDX (see Cyclonite)				
Resorcinol [108-46-3]	10	45	20	90
Rhodium [7440-16-6]				
Metal	—	1	—	—
Insoluble compounds, as Rh	—	1	—	—
Soluble compounds, as Rh	—	0.01	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m^3	ppm	mg/m^3
Ronnel [299-84-3]	—	10	—	—
Rosin core solder pyrolysis products as formaldehyde	—	0.1	—	—
Rotenone (commercial) [83-79-4]	—	5	—	—
Rouge	—	10(e)	—	—
Rubber solvent (Naphtha)	400	1,600	—	—
Selenium compounds, [7782-49-2] as Se	—	0.2	—	—
Selenium hexafluoride, [7783-79-1] As Se	0.05	0.2	—	—
Sesone [136-78-7]	—	10	—	—
Silane (see Silicon tetrahydride)				
Silica — Amorphous				
Diatomaceous earth (uncalcined) [61790-53-2]	—	10(e)	—	—
Precipitated silica	—	10(e)	—	—
Silica gel	—	10(e)	—	—
Silica — Crystalline				
Cristobalite [14464-46-1]	—	0.05,(i) Respirable dust		
Quartz [14808-60-7]	—	0.1,(i) Respirable dust		
Silica, fused [60676-86-0]	—	0.1,(i) Respirable dust		
Tridymite [15468-32-3]	—	0.05,(i) Respirable dust		
Tripoli [1317-95-9]	—	0.1,(i) of contained respirable quartz		

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m^3	ppm	mg/m^3
Silica, fused (see Silica — Crystaline)				
Silica, gel (see Silica — Amorphous)				
Silicon [7440-21-3]	—	10(e)	—	—
Silicon carbide [409-21-2]	—	10(e)	—	—
Silicon tetrahydride [7803-62-5]	5	7	—	—
Silver [7440-22-4]				
Metal	—	0.1	—	—
Soluble compounds, as Ag	—	0.01	—	—
Soapstone				
Respirable dust	—	3(i)	—	—
Total dust	—	6(e)	—	—
Sodium azide [26628-22-8]	C0.1	C0.3	—	—
Sodium bisulfite [7631-90-5]	—	5	—	—
Sodium 2,4-dichloro-phenoxyethyl sulfate (see Sesone)				
Sodium fluoroacetate [62-74-8] — Skin	—	0.05	—	0.15
Sodium hydroxide [1310-73-2]	—	C2	—	—
Sodium metabisulfite [7681-57-4]	—	5	—	—
Starch [9005-25-8]	—	10(e)	—	—
Stearates (^{n})	—	10(e)	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
Stibine [7803-52-3]	0.1	0.5	—	—
Stoddard solvent [8052-41-3]	100	525	—	--
Strychnine [57-24-9]	—	0.15	—	—
Styrene, monomer [100-42-5] — Skin	50	215	100	425
Subtilisins [1395-21-7] (Proteolytic enzymes as 100% pure crystalline enzyme)	-C0.00006(k)		—	—
Sucrose [57-50-1]	—	10(e)	—	—
Sulfotep [3689-24-5] — Skin	—	0.2	—	—
Sulfur dioxide [7446-09-5]	2	5	5	10
Sulfur hexafluoride [2551-62-4]	1,000	6,000	—	—
Sulfuric acid [7664-93-9]	***—***	***1***	***—***	***3***
Sulfur monochloride [10025-67-9]	C1	C6	—	—
Sulfur pentafluoride [5714-22-7]	C0.01	C0.1	—	—
Sulfur tetrafluoride [7783-60-0]	C0.1	C0.4	—	—
Sulfuryl fluoride [2699-79-8]	5	20	10	40
Sulprofos [35400-43-2]	—	1	—	—
Systox (see Demeton)				
2,4,5-T [93-76-5]	—	10	—	—
Talc [14807-96-6] (containing no asbestos fibers)	—	2,(i) Respirable dust		
Talc (containing asbestos fibers)	Use asbestos TLV-TWA.(l)			

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m^3	ppm	mg/m^3
Tantalum [7440-25-7] metal & oxide dusts	—	5	—	—
TEDP (see Sulfotep)				
Tellurium & compounds, [13494-80-9] as Te	—	0.1	—	—
Tellurium hexafluoride, [7783-80-4] as Te	0.02	0.2	—	—
Temephos [3383-96-8]	—	10	—	—
TEPP [107-49-3] — Skin	0.004	0.05	—	—
Terphenyls [26140-60-3]	C0.5	C5	—	—
1,1,1,2-Tetrachloro-2,2-difluoroethane [76-11-9]	500	4,170	—	—
1,1,2,2-Tetrochloro-1,2-difluoroethane [76-12-0]	500	4,170	—	—
1,1,2,2-Tetrachloroethane [79-34-5] — Skin	1	7	—	—
Tetrachloroethylene (see Perchloroethylene)				
Tetrachloromethane (see Carbon tetrachloride)				
Tetrachloronaphthalene [1335-88-2]	—	2	—	—
Tetraethyl lead [78-00-2] as Pb — Skin	—	0.1(m)	—	—
Tetrahydrofuran [109-99-9]	200	590	250	735
Tetramethyl lead [75-74-1], as Pb — Skin	—	0.15(m)	—	—
Tetramethyl succinonitrile [3333-52-6] — Skin	0.5	3	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	ppm	mg/m³	ppm	mg/m³
Tetranitromethane [509-14-8]	1	8	—	—
Tetrasodium pyrophosphate [7722-88-5]	—	5	—	—
Tetryl [479-45-8]	—	1.5	—	—
Thallium [7440-28-0] Soluble compounds, as Tl — Skin	—	0.1	—	—
4,4'-Thiobis (6-tertbutyl-m-cresol) [96-69-5]	—	10	—	—
Thioglycolic acid [68-11-1] — Skin	1	4	—	—
Thionyl chloride [7719-09-7]	C1	C5	—	—
Thiram [137-26-8]	—	*1*	—	—
Tin [7440-31-5]				
Metal	—	2	—	—
Oxide & inorganic compounds, except SnH_4, as Sn	—	2	—	—
Organic compounds, as Sn — Skin	—	0.1	—	(—)
Titanium dioxide [13463-67-7]	—	10(e)	—	—
o-Tolidine — Skin [119-93-7]	A2	A2	—	—
Toluene [108-88-3]	100	375	150	560
Toluene-2,4- diisocyanate (TDI) [584-84-9]	0.005	0.04	0.02	0.15
o-Toluidine [95-53-4] -Skin	2, A2	9, A2	—	—
m-Toluidine [108-44-1] — Skin	2	9	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
p-Toluidine [106-49-0]- Skin	2, A2	9, A2	—	—
Toluol (see Toluene)				
Toxaphene (see Chlorinated camphene)				
Tributyl phosphate [126-73-8]	0.2	2.5	—	—
Trichloroacetic acid [76-03-9]	1	7	—	—
1,2,4-Trichlorobenzene [120-82-1]	C5	C40	—	—
1,1,1-Trichloroethane (see Methyl chloroform)				
1,1,2-Trichloroethane [79-00-5] — Skin	***10***	***55***	**—**	**—**
Trichloroethylene [79-01-6]	50	270	200	1,080
Trichlorofluoromethane [75-69-4]	C1,000	C5,600	—	—
Trichloromethane (see Chloroform)				
Trichloronaphthalene- [1321-65-9] — Skin	—	5	—	—
Trichloronitromethane (see Chloropicrin)				
1,2,3-Trichloropropane [96-18-4] — Skin	10	60	—	—
1,1,2-Trichloro-1,2,2-trifluoroethane [76-13-1]	1,000	7,600	1,250	9,500
Tricyclohexyltin hydroxide (see Cyhexatin)				
Tridymite (see Silica — Crystaline)				

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
Triethylamine [121-44-8]	10	40	15	60
Trifluorobromomethane [75-63-8]	1,000	6,100	—	—
Trimellitic anhydride [552-30-7]	0.005	0.04	—	—
Trimethylamine [75-50-3]	10	24	15	36
Trimethyl benzene [25551-13-7]	25	125	—	—
Trimethyl phosphite [121-45-9]	2	10	—	—
2,4,6-Trinitrophenol (see Picric acid)				
2,4,6-Trinitrophenyl — methylnitramine, (see Tetryl)				
2,4,6-Trinitrotoluene (TNT) [118-96-7] — Skin	—	0.5	—	—
Triorthocresyl phosphate [78-30-8] — Skin	—	0.1	—	—
Triphenyl amine [603-34-9]	—	5	—	—
Triphenyl phosphate [115-86-6]	—	3	—	—
Tripoli (see Silica — Crystaline)				
Tungsten [7440-33-7] as W				
Insoluble compounds	—	5	—	10
Soluble compounds	—	1	—	3
Turpentine [8006-64-2]	100	560	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
Uranium (natural) [7440-61-1] — Soluble & insoluble compounds as U	—	0.2	—	0.6
n-Valeraldehyde [110-62-3]	50	175	—	—
Vanadium, as V_2O_5 [1314-62-1] Respirable dust & fume	—	0.05	—	—
Vegetable oil mists (o)	—	10(e)	—	—
Vinyl acetate [108-05-4]	10	30	20	60
Vinyl benzene (see Styrene)				
Vinyl bromide [593-60-2]	5, A2	20, A2	—	—
Vinyl chloride [75-01-4]	5, A1	10, A1	—	—
Vinyl cyanide (see Acrylonitrile)				
Vinyl cyclohexene dioxide [106-87-6] — Skin	10, A2	60, A2	—	—
Vinylidene chloride [75-35-4]	5	20	20	80
Vinyl toluene [25013-15-4]	50	240	100	485
VM & P Naphtha [8032-32-4]	300	1,350	—	—
Warfarin [81-81-2]	—	0.1	—	—
Welding fumes (NOC+)	—	5,B2	—	—
Wood dust (certain hard woods as beech and oak)	—	1	—	—
Soft wood	—	5	—	10
Xylene (o-, m-, p-isomers) [1330-20-7; 95-47-6; 108-38-3; 106-42-3]	100	435	150	655
m-Xylene, ∝, ∝'-diamine [1477-55-0] — Skin	—	C0.1	—	—

Table 2-1 — *Continued*

	Adopted Values			
	TWA		STEL	
Substance [CAS #]	**ppm**	**mg/m³**	**ppm**	**mg/m³**
Xylidine — Skin [1300-73-8]	***0.5,A2***	***2.5,A2***	—	—
Yttrium [7440-65-5] metal and compounds, as Y	—	1	—	—
Zinc chloride fume [7646-85-7]	—	1	—	2
Zinc chromates as Cr [13530-65-9; 11103-86-9; 37300-23-5]	—	0.01,A1	—	—
Zinc oxide [1314-13-2]				
Fume	—	5	—	10
Dust	—	10(e)	—	—
Zirconium compounds [7440-67-2] as Zr	—	5	—	10

Table 2-2**

Maximum permissible noise exposure for unprotected ears on a daily basis:

Lex=85 dBA average for 8 hours, or equivalent, including impact noise except

(a) no exposure to steady state noise over 109 dBA, and

(b) no exposure to impact noise over 140 dBA,

where

(1) "Lex" is the daily average noise exposure which would be the equivalent of 85 dBA for 8 hours (*see* examples below).

(2) "steady state noise" means in which variations of peak pressure levels in one second or less,

(3) "impact noise" means noise in which variations of peak pressure levels occur greater than one second apart,

Examples of equivalent levels to 85 dBA for 8 hours:

Length of Exposure	Average Noise Level
16 hours	82 dBA
12 hours	83 dBA
10 hours	84 dBA
8 hours	85 dBA
4 hours	88 dBA
2 hours	91 dBA
1 hours	94 dBA
½ hours	97 dBA
¼ hours	100 dBA

Table 2-3

Maximum Equivalent Noise Level, dBA	**Required Class of Hearing Protector**
Leq less than 85 dBA	No protection required
Leq up to 89 dBA	Class C
Leq up to 95 dBA	Class B
Leq up to 105 dBA	Class A
Leq up to 110 dBA	Class A plug+Class A or Class B muff
Leq more than 110 dBA	Class A plug+Class A or Class B muff and limited exposure

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Note: The above noted hearing protection selection recommendations are those of the Canadian Standards Association.

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PERSONNEL SAFETY

Definitions

"*confined space*" means a tank, process vessel, underground vault, tunnel, or other enclosure not designed or intended for human occupancy. A person would enter it only if there was work to be done.

Impairment and Conduct

Impaired Persons

3.1.1 No person shall enter, remain, or be knowingly permitted to enter or remain in any mine if, in the opinion of the supervisor, his ability is so impaired as to endanger his health or safety or that of another person.

Drugs and Liquor

3.1.2 No person shall possess intoxicating liquor or illegal drugs in or about a mine.

Improper Conduct

3.1.3 No person shall engage in any improper or foolhardy behaviour such as horseplay, scuffling, fighting, playing practical jokes, or other conduct that might create or constitute a hazard to himself or any other person.

Tampering with Safety Devices and Equipment

3.1.4 No person shall, without cause, render ineffective any device, equipment, or material provided for the protection of the health and safety of persons employed in, on or about a mine, or the safety of the public.

General Safety Rules

Age

3.2.1 The manager shall not employ any person under the age of 18 years at a mine except for the purpose of training that person.

Tallying

3.2.2 The manager shall ensure that a method acceptable to the district inspector is adopted to account for all persons going on and off shift.

Working Alone 3.2.3 When a worker is working alone and may not be able to secure assistance in the event of injury or other misfortune, the manager shall ensure that a means exists for checking the well-being of the worker and that the interval between checks does not exceed 2.5 hours.

Transportation of Persons 3.2.4 No person shall be transported in the box of a pickup or service truck, and no person shall ride in a standing position.

Working Conditions

Hazardous Work 3.3.1 The manager or a person authorized by him shall personally supervise all work involved in correcting an unusual hazard and such work shall be carried out in accordance with safe working practices and in compliance with this code and with a plan approved by the manager.

Falling Objects 3.3.2 No persons shall be allowed in any location at a mine where persons are working overhead unless adequate protection is provided for their safety.

Water Hazard 3.3.3 When persons are required to work or be near water, where drowning could be a risk

(1) the manager shall provide, at conspicuous locations, lifebuoys equipped with heaving lines of adequate length which conform with Ministry of Transport (Canada) standards, and

(2) if persons are required to be transported across water, the manager shall provide each of them with a personal flotation device conforming to Canadian Government Specifications Board Standard CAN/CGSB-65.7-M88.

Moving Machinery and Electrical Contact 3.3.4 Where there is a risk of a worker coming into contact with moving parts of machinery or with electrically energized equipment, or where the work process is such that a similar hazard exists

(1) the clothing of workers shall fit closely about the body,

(2) dangling neckwear, bracelets, wrist-watches, rings, or similar articles shall not be worn,

(3) the wearing of medic-alert bracelets is permitted when such bracelets are used with transparent rubber bands that fit snugly over the bracelets,

(4) cranial and facial hair shall be confined, or worn at a length which will prevent it from being snagged or caught in the work process.

Materials Handling

3.3.5 Where a materials handling task endangers the safety of the persons doing the work, the manager shall ensure that

(1) the physical parameters of the handling task are redesigned, or

(2) mechanical lifting aids or personal protective equipment is provided, or

(3) the work area where the work is carried out is redesigned to eliminate unsafe conditions relating to floor surfaces, lighting, or obstruction to materials handling, or

(4) a combination of (1), (2), or (3) is implemented.

3.3.6 Where the equipment, work procedure, or working conditions in a work area has caused injurious inflammation of muscles, tendons, or bursae of the upper limbs of the persons doing the work, and it is demonstrated to be from repetitive or forceful use, the chief inspector shall, where practicable, require implementation of one or more of the following preventive measures

(1) modification of work procedures or equipment to reduce physical demands on affected body areas, or

(2) a rescheduling of work to permit safe adjustment to unaccustomed task requirements.

Hazardous Atmosphere — Confined Spaces

Work in Confined Spaces

3.4.1 The manager shall ensure that written procedures acceptable to the district inspector are developed and implemented for work in confined spaces where irrespirable, toxic, or flammable atmospheres might be encountered.

Safe Work Procedures to Include

3.4.2 The procedures required under section 3.4.1 shall include

(1) the use of lifelines and safety belts whenever possible,

(2) when lifelines and safety belts cannot be used, two persons with respiratory protective equipment and capable of performing a rescue shall be stationed outside the confined space in which persons are working to visually check the persons in the confined space at frequent intervals,

(3) maintenance of an effective means of communication between persons inside and outside the confined space,

(4) specified time intervals for making periodic visual contact with persons inside the confined space,

(5) specific procedures to be followed whenever welding or burning operations are to be carried out in the confined space,

(6) appropriate breathing apparatus and persons trained in its use, and readily available at every confined space in which persons are working,

(7) compressed air used for breathing complying with the requirements of CSA Standard CAN-3-Z180.1-M85 Series, and

(8) disconnection, blanking or blinding off pipes carrying substances that could be hazardous to the persons entering the confined space.

Test of Confined Space

3.4.3 A person without self-contained breathing apparatus shall not enter a confined space in which a harmful atmosphere might exist or develop until

(1) tests have been made to determine the nature and quantity of harmful vapours, gases, fumes, mists, dusts, and the oxygen content of the atmosphere inside the confined space and these test results shall be recorded in a logbook kept for that purpose.

(2) the written work procedures under section 3.4.1 have been read and understood by the person and the required emergency and rescue procedures are in place, and

(3) the confined space is being ventilated continuously by a natural or forced ventilation system.

Tests at Intervals

3.4.4 Tests of the atmosphere inside the confined space shall be made at intervals during the work process to ensure that the quality of the air does not deteriorate and the test results shall be recorded as required by section 3.4.3 (1).

Confined Space Ventilation

3.4.5 Where tests made under sections 3.4.3 or 3.4.4, or any other test or examination indicates a harmful atmosphere or the presence of a harmful substance, the confined space shall be ventilated or cleaned, or both, and re-tested or re-examined to ensure that no person without self-contained breathing apparatus is allowed to enter the confined space unless

(1) the atmosphere or substance in the confined space is no longer considered harmful according to the acceptable standards prescribed in Part 2 of the code, and

(2) the oxygen content of the atmosphere inside the confined space is not less than 18%.

Wearing of Protective Equipment

3.4.6 Where tests under sections 3.4.3 and 3.4.4 indicate the presence of harmful or explosive substances and it is not practicable to provide a safe, respirable atmosphere

(1) the persons entering the confined space shall wear self-contained breathing apparatus and personal protective equipment,

(2) the concentration of flammable substances shall be maintained below 20% of the lower explosive limit as determined by repeated testing,

(3) all possible sources of ignition shall be eliminated or controlled where flammable substances exist, and

(4) the persons entering shall be attended by two designated persons stationed immediately outside the confined space who shall visually check those persons in the confined space at frequent intervals and who are equipped and capable of performing a rescue.

Fire Prevention

Open Flames Underground

3.5.1 No person shall

(1) light or build a fire in an underground mine, or

(2) weld, cut by the use of heat or flame, or use a blowtorch in an underground coal mine without the written permission of the district inspector.

Prohibited Articles

3.5.2 No person shall possess while underground in a coal mine or in any part of a mine designated by the manager

(1) a match or apparatus of any kind for creating an open flame or spark except as exists in a flame safety lamp, or

(2) cigarettes, cigars or smoking materials in any form.

Designation of Fire Hazard Areas

3.5.3 Fire hazard areas shall be identified by warning signs, and persons shall not smoke, use open flame lamps, matches, or other means of producing heat or fire in designated fire hazard areas.

EMERGENCY PREPAREDNESS

Industrial First Aid

First Aid Supplies

3.6.1 The manager shall provide and maintain first aid supplies and services as required by the Workers' Compensation Board.

3.6.2 The chief inspector may order an increase in the first aid supplies or services required by section 3.6.1.

Means of Communication

3.6.3 The manager shall provide a means of communication acceptable to the district inspector by which the services of a physician can be obtained expeditiously.

Mine Rescue

Mine Rescue Emergency Plan

3.7.1 The manager shall develop and file with the district inspector, a mine rescue emergency plan which shall be kept up to date and followed in the event of an emergency.

Underground

3.7.2 The manager shall ensure that the mine has

(1) where the number of persons employed underground at any one time is more than 10 but less than 50, at least one fully trained and equipped mine rescue team, and

(2) where the number of persons employed underground at any one time is 50 or more, at least two fully trained and equipped mine rescue teams.

Open Pit

3.7.3 The manager of an open pit mine employing more than 25 persons per shift shall ensure that

(1) there is at least one fully trained and equipped mine rescue team, and

(2) on every shift where more than 10 persons are working, there are four persons trained in mine rescue procedures.

Mine Rescue

3.7.4 The manager of a mine employing less than 10 persons underground at any one time shall

(1) develop a mine rescue emergency plan and have it approved by the district inspector, and

(2) maintain such rescue apparatus and equipment as prescribed by the district inspector ***and ensure that personnel are adequately trained in its use.***

Team Complement

3.7.5 The normal complement of a mine rescue team shall be ***6 qualified members, one of whom shall be the team captain, one the vice-captain, and one the co-ordinator who shall remain at the fresh air base at all times.***

Mine Rescue Teams

3.7.6 A person shall not be considered as a qualified member of a mine rescue team unless

(1) possessing a valid mine rescue certificate and a valid St. John "Standard" first aid certificate, or equivalent,

(2) free from a beard, moustache, or sideburns that could interfere with the facepiece seal of any breathing apparatus, and

(3) considered competent to act as a mine rescue team member by the person appointed as a trainer under section 3.7.9.

3.7.7 The manager shall send a list of the names of the qualified team members to the district inspector on June 30th and December 30th of each year.

3.7.8 The trainer appointed under section 3.7.9 shall record in a suitable logbook

(1) the dates and times of all team practices,

(2) the names of those attending and absent, if any, with reasons for their absence,

(3) a brief description of what was practised,

(4) the equipment used and its condition at the end of the practice session, and

(5) any other relevant information.

Training for Mine Rescue

3.7.9 The manager shall

(1) appoint a qualified person as a trainer for mine rescue team members,

(2) ensure that all mine rescue team members practice as a team for not less than ***8 hours during*** each 3 months the mine operates,

(3) ensure that all mine rescue personnel are not underground at any one time except during rescue work or training,

(4) ensure that no person shall be selected for mine rescue training in order to become a qualified team member unless he possesses a valid St. John "Standard" first aid certificate or equivalent and, in the case of an underground mine, not less than 6 months experience in underground work.

Type of Breathing Apparatus

3.7.10 Where self-contained breathing apparatus is required, it shall be of a type approved by the chief inspector.

Mine Plans for Rescue Purposes

3.7.11 The manager shall ensure that the plans required under Part 6 of the code are readily available for the use of mine rescue teams.

3.7.12 The manager shall appoint a qualified person to be responsible for the maintenance and repair of the rescue apparatus and advise the district inspector in writing of the appointment.

3.7.13 The rescue apparatus shall be continuously maintained in accordance with the manufacturer's recommendations and stored in a room set aside for that purpose so as to be always available for immediate use.

Emergency Training

3.8.1 One or more units of self-contained breathing apparatus and a fully charged cylinder of compressed air containing not less than 8.5 cubic metres of free air at normal local atmospheric conditions shall be maintained in every underground hoist room.

Hoistman Training

3.8.2 (1) The manager shall ensure that every hoistman and cage tender who may be required to use demand breathing apparatus is trained in its proper use.

(2) Every hoistman and cage tender who may be required to use demand breathing apparatus shall be responsible for ensuring that the apparatus is always readily available to them while they are underground.

Survival Rescue Procedures

3.8.3 The manager shall ensure that all persons who are required to work underground are trained and retrained annually in survival rescue procedures, including the use of self-rescue apparatus authorized by the chief inspector.

Instructor Emergency Procedures

3.8.4 The manager of an open pit mine shall appoint a qualified person to instruct and train personnel in the techniques of emergency rescue procedures.

Surface Emergency

3.8.5 The manager of a surface mine shall ensure that emergency procedures, properly maintained equipment, and trained personnel are available to respond to a fire, explosion, or dangerous incident while the mine is in operation.

Surface Fire Fighting

Fire Fighting Equipment

3.9.1 (1) The manager shall ensure that fire fighting equipment is provided and maintained in or about every headframe, portal house, shaft house, processing plant and other buildings at a mine where fire may endanger life.

(2) The National Fire Code of Canada 1980 and subsequent supplements and revisions shall apply in determining the level of fire fighting equipment and maintenance as prescribed in subsection (1).

Underground Fire Fighting

3.10.1 The manager shall ensure that fire fighting equipment is provided and maintained at all underground crusher stations, electrical installations, pump stations, shaft stations, tipples, conveyors, service garages, fueling stations, and where a fire hazard may exist.

3.10.2 (1) At least 2 suitable fire extinguishers shall be provided and maintained at each stationary electric or diesel motor, transformer, and at any switchgear in use underground.

(2) The location of the fire fighting equipment required by sections 3.10.1 and 3.10.2 (1) shall be such that, in the event of a fire, the direction of the mine ventilation air flow will not prevent or hamper the effective use of the equipment

3.10.3 Fire extinguishers which are capable of giving off or generating poisonous gas when operated shall not be allowed below ground.

Inspection of Fire Equipment

3.10.4 The manager shall ensure that inspection and, if necessary, testing and maintenance of all fire fighting equipment are carried out by a qualified person at least once a month.

Training in Fire Fighting

3.10.5 The manager shall ensure that the following training in fire fighting is carried out under the direction of a qualified person

(1) all persons newly employed at a mine shall be given instruction in the use of fire fighting equipment during the first three months of employment, and

(2) all persons continually employed underground shall receive a refresher course in the use of fire fighting equipment at intervals not exceeding 2 years.

Record of Practices

3.10.6 The qualified person appointed by the manager to carry out the training required under section 3.10.5 shall record all drills and practices and the name of each person in attendance.

Fire Fighting Plans

3.10.7 The position of all fire fighting pipe lines, hydrant valves, fire stations, and fire cabinets shall be shown on a plan drawn to a scale of not less than 1:2500 with a metric scale bar and a marked north point. The plan shall be updated at intervals not exceeding three months.

Underground Coal Fire Fighting

Minimum Requirements

3.11.1 A reservoir containing not less than 100,000 L of water at all times shall be maintained to supply water at adequate volume and pressure to underground coal mine workings.

Provision of Hydrants

3.11.2 Fire hydrants, operated by wheel valves, shall be located

(1) 20 m on the intake side of conveyor loading and transfer points, main junctions, and electrical substations,

(2) along such roadways as prescribed by the district inspector at intervals not exceeding 100 m, and

(3) at suitable central points in room and pillar workings.

Fire Fighting Equipment

3.11.3 In close proximity to each fire hydrant there shall be a cabinet containing

(1) a branch pipe and nozzle of 40 mm minimum internal diameter, and

(2) sufficient lengths of hose to cover the distance between each cabinet, and the hose shall have a minimum internal diameter of 40 mm and a working pressure 1 000 kPA.

3.11.4 (1) A fire station shall be situated at the bottom level and at every intermediate level of a downcast shaft or slope which provides access to active working areas of the mine.

(2) In the case of a drift mine with a walkable intake airway, the chief inspector may give permission for the fire station to be situated on the surface close to that airway.

3.11.5 The minimum equipment housed in or near a fire station shall be

(1) not less than 120 m of fire hose with couplings, branch pipe, and nozzle of 40 mm minimum inlet diameter designed to a working pressure of 1 000 kPa,

(2) a backup supply of fire extinguishers, and

(3) a supply of sand bags or equivalent acceptable to the inspector.

Gas Detectors

Approved Detecters

3.12.1 Every device used for the detection of flammable or noxious gas at a surface or underground mine shall be of a type approved by the chief inspector.

Servicing Detectors

3.12.2 The manager shall appoint a qualified person to be responsible for maintaining the appliances used for detection of flammable or noxious gases.

Use of Appliance

3.12.3 Persons authorized to carry and use an appliance for the detection of flammable or noxious gas shall

(1) check the appliance for damage and to ensure it is in proper working order before use,

(2) not use the appliance if found damaged or dysfunctional, and

(3) take all reasonable precautions to prevent the appliance from being damaged,

Relighting Flame Safety Lamp

3.12.4 In the case of a flame safety lamp with a self-contained relighting device, not attempt to relight the lamp if the presence of flammable gas is suspected.

Evacuation

Procedures and Instructions

3.13.1 The manager of a mine shall

(1) prepare procedures for the safe evacuation of the mine or part of the mine in the event of a fire and for the control of the fire,

(2) post copies of the procedure in conspicuous places at the surface and underground, and

(3) ensure that each employee receives instruction in the procedures prepared under subsection (1) and that he can recognize the emergency warning system and is familiar with the emergency escape routes from the mine.

Emergency Warning System

3.13.2 The manager shall develop and maintain a system acceptable to the chief inspector for warning all employees, whether underground or in buildings on the surface, of an emergency requiring prompt evacuation of their work places.

Test of System

3.13.3 A test of the warning system required under section 3.13.2 that does not involve evacuation of key process personnel shall be carried out at least once every 12 months on a production shift, and the manager shall ensure that key process personnel unable to evacuate are knowledgeable with the warning system and the evacuation procedure.

Report of Test

3.13.4 A report of all emergency warning system tests, including their effectiveness, shall be sent to the district inspector.

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Buildings — General

Definitions

"*standard guardrail*" means a guardrail structure comprised of a top rail approximately 1 070 mm (42") above floor level, a toe-board, and a midrail approximately midway between the underside of the top rail and the upper edge of the toe-board. They shall be designed to withstand a load of 900 N (200 lbs.) applied in any direction and at any point on the top rail.

"*toe-board*" means a metal or wood guard strip, approximately 100 mm in height, placed along the bottom of a guardrail structure, and having a clearance of not greater than 13 mm (½") between its lower edge and the walkway or platform to prevent tools or other material from falling off.

Design and Construction

4.1.1 (1) All buildings shall be constructed in accordance with the British Columbia Building Code.

(2) Where a building or structure is to be constructed, altered, dismantled, moved, or where major repairs are to be made, the manager shall ensure that

(a) drawings are prepared clearly showing all required field connections and any other information necessary for the safe completion of the work, or

(b) the work is supervised by a professional engineer.

(3) Drawings of the completed building or structure shall be kept at the mine and any revisions to the drawings shall be noted.

Proximity to Underground Workings

4.1.2 (1) Any building, whether or not attached to a headframe or other entrance to an underground mine, shall be of non-combustible construction for any portion that is within 15 m of the headframe or entrance to the mine.

(2) The remainder of the building shall be either of non-combustible construction or separated from the non-combustible section by a firewall, having a 4-hour fire resistance rating, and constructed in accordance with the British Columbia Building Code.

Portable Heaters

4.1.3 Every portable heater shall conform to the relevant sections of the following codes, as amended from time to time

(1) CSA Standard B139-1976 "Installation Code for Oil Burning Equipment",

(2) CAN/CGA-B149.1-M86, "Natural Gas Installation Code",

(3) CAN/CGA-B149.2-M86, "Propane Installation Code",

(4) CSA Standard C22.1-1986 "Canadian Electrical Code, Part 1", and

(5) CSA Standard B51-M1986 "Boiler, Pressure Vessel, and Pressure Piping Code".

Access to Work Areas

4.1.4 (1) The manager shall ensure that all places where work is performed have safe means of access and egress and if necessary an alternate means of escape appropriate to the conditions of the work, and workers shall not use any other means that are, or may be, hazardous.

(2) Where required by an inspector, aisles and passageways in work and in storage areas shall be clearly delineated by floor markings. Such markings shall be maintained in a clearly visible condition.

(3) (a) Emergency exits shall be clearly marked and designed to provide quick and unimpeded exit.

(b) Doors shall not open directly onto stairways, but shall open onto floors or landings having a width in excess of the swing of the doors.

(c) Double-acting swing doors shall be designed and installed to permit an adequate view through the doors.

(d) Transparent glass doors and glass panels shall be constructed of laminated, tempered, or wired safety glass meeting the current requirements of the British Columbia Building Code.

Equipment Entranceways to Buildings

4.1.5 (1) Any entranceway constructed after this code comes into effect, other than for persons, through which equipment is moved shall

(a) exceed in width by at least 500 mm the width of the equipment where the width of the equipment is less than 3 m,

(b) exceed in width by at least 1 m the width of the equipment where the width of the equipment is 3 m or greater, and

(c) exceed in height by at least 300 mm the height of the equipment.

(2) All new installations and, when required by the chief inspector, existing power-operated vertical doors installed in equipment entranceways shall have devices along the lower edge which will automatically stop movement of the door upon sensing an intermediate obstruction or when it reaches floor level.

Storage of Materials

4.1.6 (1) No material or equipment shall be so placed, stacked, or stored as to constitute a hazard to persons.

(2) No person shall enter a bin, stockpile area, or any place where there is a danger of becoming trapped in loose material unless safe access has been provided by catwalks, walkways, or other means, or unless he is equipped with a safety belt and a secured lifeline and is attended by another person who is capable of effecting an immediate rescue.

(3) Any area upon which materials may be dropped or dumped shall be barricaded and posted with warning signs to prevent persons from inadvertently entering.

Handrails and Guardrails

4.1.7 (1) Every flight of stairs having more than 4 risers shall be equipped with handrails on all open sides of the stairways, and on one side of an enclosed stairway 1.12 m or less in width, and on both sides of an enclosed stairway over 1.12 m in width.

(2) The top of a handrail shall be at a height of 810 mm to 910 mm above the stair tread, measured vertically from the nose of the tread, and the height shall not vary on any flight or succession of flights of stairs.

(3) Handrails on open-sided stairways shall be fitted with midrails located approximately equidistant from the top of the handrail and the nose of the stair tread.

(4) When a stairway ends in direct proximity to dangerous traffic or other hazards, detour guardrails shall be installed.

Standard Guardrails

4.1.8 (1) Standard guardrails shall be installed where any open-sided floor, working platform, runway, walkway, or balcony is more than 1 m above grade or floor level.

(2) When persons are employed around open tanks, containing liquids or harmful substances, the sides of the tanks shall be constructed to extend at least 1 m above any working platform, or standard guardrails shall be provided to prevent persons from falling into the tanks.

Floor Openings

4.1.9 Openings or pits in floors, roofs, walkways or work areas accessible to persons, shall be securely covered or fitted with fixed, removable or collapsible guardrails.

Toe-boards

4.1.10 (1) Notwithstanding section 4.1.7, toe-boards are not required to be installed with a standard guardrail

- (a) where persons do not or can not work underneath, or
- (b) where there is no machinery located below.

(2) Where materials are stored nearby, toe-boards shall be increased in height, or solid or mesh panels of appropriate height shall be installed to prevent any material from falling.

Walkways and Vehicle Curbs

4.1.11 (1) Walkways shall not be less than 500 mm in width and shall be provided with safe access by stairways or fixed ladders.

(2) Where necessary, curbs or bullrails not less than 250 mm in height, or similar means, shall be used to prevent vehicles or other equipment from running off the edge of an elevated surface.

Buildings — Surface

Repair Shops

4.2.1 (1) A repair shop shall be located such that site conditions favour adequate drainage away from the shop.

(2) Designated parking areas in the vicinity of the repair shop shall be clearly marked.

Coal Preparation Plant

4.2.2 Where combustible dusts may be continuously, or intermittently, in suspension in the air in coal preparation plants, a dust collecting system shall be provided and shall

(1) if constructed after this code comes into effect, be located away from the working area, outside the building or in a separate room properly ventilated to the outside,

(2) if a dry-type, be of non-combustible construction and equipped with adequate explosion doors or vents, and

(3) if a bag type, only have bags made of anti-static, fire resistant material and be provided with an effective electrical ground.

Dry-type Dust Collectors

4.2.3 A dry-type coal baghouse dust collector shall be provided with a device to

(1) detect the presence of hot or glowing particles upstream from the collector and trigger a quenching action, and

(2) sense a rise in temperature within the collector and sound an alarm and initiate an automatic quenching action at pre-set temperature levels.

Explosion Venting

4.2.4 (1) Provisions shall be made for venting an explosion from any coal preparation plant building that produces, or may produce, airborne dust.

(2) Ventilating hoods and exhaust ducts shall not be used as explosion venting devices unless they are properly designed for a dual purpose.

Monitoring of Explosive Atmospheres

4.2.5 Where explosive atmospheres may occur, such as in, above, or below a coal silo, continuous monitoring of the atmosphere shall be instituted.

Thermal Drier Discharge

4.2.6 (1) Thermal coal dryers constructed after June 1, 1990 shall have equipment to continuously monitor coal discharge for hot or glowing embers of coal and, if detected, an automatic quenching system shall be activated.

(2) Where existing thermal coal dryers are not equipped with glowing ember detection and quenching systems the manager shall, within 6 months of proclamation of the code, submit an engineering report to the chief inspector for the installation or justification of a system which will provide equal or better protection to that required under section 4.2.6 (1).

Underground Enclosures

(Fuel Pipelines and Storage)

"underground enclosure defined" in this part means any area in an underground mine that is used to enclose equipment, machinery, or to provide shelter, and is a suitable working environment. It includes service garages, fuelling stations, fuel, and lubrication storage areas.

Underground Enclosures

4.3.1 All underground enclosures, including service garages, oil and grease storage areas and fuelling stations, authorized by 6.35.1 and 6.36.1, shall

(1) be designed and protected to prevent the inadvertent entry of an uncontrolled vehicle,

(2) have safe means of entry and exit appropriate for the conditions and purpose of the enclosure,

(3) be equipped with adequate fire protection, and

(4) be adequately ventilated to suit the purpose of the enclosure.

Underground Service Areas

4.3.2 Every underground service garage, fuelling station and oil and grease storage area shall

(1) be located so that a fire or explosion inside the facility would have a minimal effect on other working areas of the mine and on underground installations,

(2) be equipped with an automatically actuated fire suppression system that has been properly designed and installed to provide effective fire protection,

(3) be provided with means for manually actuating the fire suppression system from several locations inside the enclosure and at least one location outside the entrance, and whenever the fire suppression system is actuated, an alarm shall be given automatically at suitable, manned locations on the surface of the mine and underground, or at a central fire control station,

(4) have a concrete floor without service pits,

(5) be equipped with means for containing spills of fuel, oil or grease including the use of fireproof receptacles into which the spilled fuel, oil or grease shall be deposited and removed from the mine without undue delay, and

(6) have adequate clearances for the safe performance of all work.

Underground Fuelling Stations

4.3.3 (1) The manager shall notify the district and mechanical inspectors, in writing, of the intention to construct an underground fuelling station.

(2) No smoking shall be allowed in, or near, a fuelling station and signs to this effect shall be posted in conspicuous locations.

(3) A fuelling station shall

- (a) be separate from service garage,
- (b) incorporate a sill or curb to contain spilled fluids, and
- (c) be totally enclosed, equipped with a self-closing door of non-flammable construction.

(4) Where a mobile fuelling supply tank is used, the tank shall be clearly labelled with "No Smoking" signs and no person shall smoke within 10 m.

(5) Where practical, vehicles shall only be fuelled at recognized fuelling stations.

Underground Oil and Grease Storage Areas

4.3.4 (1) The manager shall notify the district and mechanical inspectors, in writing, of the intention to construct an underground oil and grease storage enclosure for quantities in excess of those outlined in *4.8.1 (2) (b)*.

(2) Every underground oil and grease storage enclosure shall be separate from a service garage.

Fuel Pipelines — Underground Mines

Fuel Pipelines Underground Construction

4.3.5 Where a fuel pipeline is used in an underground mine it shall

(1) be constructed of minimum standard weight wrought iron or steel pipe or the equivalent with respect to strength, durability, corrosion and fire resistance,

(2) have leak proof joints, and if sealants or gaskets are used, they shall be approved by Underwriters Laboratories for fuel oil service,

(3) be designed, installed, and used in accordance with the manufacturer's specifications, and

(4) be drained empty after completion of each fuel transfer.

Installation

4.3.6 A fuel pipeline in an underground mine shall

(1) be installed to minimize the risk of damage and supported so as to avoid dips and sags,

(2) be clearly identified as a fuel pipeline,

(3) be pressure tested before initial use to 345 kPa above atmospheric, or 1.5 times the maximum working pressure, whichever is greater, and the pipeline shall retain the pressure for at least 2 hours after the source of pressure has been removed,

(4) be visually inspected at least once a month, and

(5) not pass through garages, switch rooms, explosive magazines, or refuge stations.

Fuel Storage Tanks Construction

4.3.7 Fuel storage tanks in a fuel transfer pipeline shall

(1) be constructed of steel and designed in accordance with good engineering practice for their location and use, and NFPA 122 "Storage of Flammable and Combustible Liquids Within Underground Metal and Non-Metal Mines (Other than Coal) 1986" may be used for the design of the tanks except where any requirement conflicts with a requirement of this Part of the code,

(2) be supported and anchored to prevent excessive stress concentration on any supporting portion of the shell, and located to minimize the risk of damage, and

(3) have vent pipes of sufficient size, located so that fumes are directed away from any place where they could be a hazard to health or safety.

Fire Protection and Control

4.3.8 Every fuel storage tank shall

(1) have a means of accurately determining the amount of fuel it contains,

(2) be identified as to its contents and that it is a fire hazard area, and

(3) be surrounded by a dike or curb capable of containing 110% of its storage capacity.

Fuel Oil Transfer Systems

4.3.9 (1) A fuel oil transfer system shall have electrical equipment complying with Section 20 of the Canadian Electrical Code, Part 1.

(2) It shall be equipped with a fire suppression system and have adequate fire extinguishers.

(3) It shall be designed and installed so that

(a) only a pre-set quantity of fuel can be transferred at one time and this quantity shall be less than 90% of the available storage capacity of the receiving tank at the time of the transfer, or

(b) when the receiving tank is full, a sensing device will stop the flow of fuel at the sending tank, or

(c) one person at the sending tank and one at the receiving tank shall have suitable communication so that the flow of fuel can be stopped at any time, and the controls and switches at the tanks shall be clearly marked.

(4) Where fuel transfer lines are installed in a shaft, fuel transfer shall not be conducted during hoisting operations.

(5) An authorized person shall be responsible for ensuring that the system is regularly inspected, cleaned and properly maintained, and that all procedures are strictly followed.

Fixed Equipment (Plant and Machinery)

Fall Arresting Devices

4.4.1 (1) Subject to subsection (5), where a person is exposed to the hazard of falling more than 3 m, he shall be provided with, and use, a fall arresting device.

(2) The fall arresting device required by subsection (1) shall comply with the relevant design and performance requirements of CSA Standard, Z259.2-1976 "Fall Arresting Devices, Personnel Lowering Devices, and Life Lines".

(3) Safety belts, harnesses, lanyards and lifelines shall not be knotted or allowed to become knotted.

(4) When in use with a fall arresting device, a lifeline shall be anchored so that a person cannot fall, free of arrest, for more than 1220 mm, and it shall be connected to an object that is free from sharp edges and capable of resisting the force of an arrest.

(5) Subsection (1) does not apply to a person employed in shaft sinking where measures are in effect to provide equal or greater protection against falling.

Moving Parts of Machinery

4.4.2 Unless situated so as to prevent a person coming into accidental contact with it, every drive belt, chain, rope or pulley, sprocket, flywheel, geared wheel and every opening through which any belt, pulley or wheel operates, and every bolt, key, set screw and every part of any wheel or other revolving part that projects unevenly from the surface shall be effectively enclosed, covered, or guarded.

Grinders

4.4.3 (1) A grinder shall be assembled, adjusted and operated in accordance with the manufacturer's specifications.

(2) The maximum speed at which a grinding wheel may be operated shall be indicated on the grinding wheel or be easily obtainable.

(3) A grinding wheel shall be

- (a) enclosed by a protective hood except for the area at the workrest,
- (b) stored where it will not be damaged by impact, extreme heat or cold, and
- (c) stopped when the grinder or workrest is being adjusted.

(4) The operator of a grinder shall wear eye protection.

(5) The workrest on a grinder shall be mounted above the centre line of the grinding wheel and not more than 3 mm from the wheel unless otherwise specified by the manufacturer.

(6) An air operated grinder shall have a governor to prevent it operating in excess of the rated speed of the grinding wheel.

(7) The governor required by subsection (6) shall be inspected regularly and maintained in proper condition.

(8) Powered grinding wheels, other than portable hand held machines, shall be equipped with an exhaust system or other means for removing dust produced during the grinding operation.

Chain Saws

4.4.4 Chain saws shall meet the requirements of CSA Standard CAN3-Z62.1-M85, "Chain Saws".

Pneumatic Tools

4.4.5 (1) Portable pneumatic nailing and stapling tools capable of driving a fastener having a nominal diameter exceeding 1.2 mm (18 gauge ASWG), shall be designed so that the operator is required to make not less than two separate operations to activate the tool. One of these operations shall be to place the tool against the work surface.

(2) Under no circumstance shall the operating trigger be taped or otherwise secured in the "on" position, or held in the "on" position while moving between operations.

(3) The air supply shall be disconnected before the tool is serviced or any adjustments made.

(4) The safe operating air pressure specified by the manufacturer for tools, hoses and fittings shall not be exceeded.

Servicing of Running Machinery

4.4.6 (1) Where machinery requires that it be serviced while in motion

(a) it shall be so constructed that the servicing may be performed without removing any protective fence or guard, and

(b) only that part of the machinery which is vital to the process shall be energized, and

(c) only qualified persons shall be employed in such operations, and

(d) the manager shall establish a safe procedure which shall be available to employees and posted in suitable locations.

(2) Where it is necessary to remove guards or fences from machinery for servicing purposes, the machinery shall be stopped and locked-out in accordance with sections 4.11.1 to 4.11.7.

Welding and Burning Equipment

4.4.7 (1) Whenever torches or welding equipment are being transported or used, the manager shall require that safe procedures are developed and followed.

(2) Every compressed gas cylinder containing fuel gas or other gas, when not in use, shall

(a) be stored in an upright position and kept in a well ventilated area free from flammable material and electrical apparatus, and

(b) have a securely fastened, approved valve protection cap, and be adequately secured by chains or other acceptable means to prevent it from being knocked over.

(3) At any time that compressed gas cylinders are being transported, they shall be secured on a special carrier or container designed for the purpose, and unless the carrier or container is of a type intended for safely moving gas cylinders, the cylinders shall be fitted with securely fastened, approved valve protection caps.

Powder-actuated Tools

4.4.8 An explosive actuated fastening tool shall be of a type and design that conforms to CSA Standard CAN3-Z166-M85 Series "Powder Actuated Tools".

Lifting Devices

4.4.9 (1) A lifting device shall be designed, constructed and installed in accordance with recognized standards and good engineering practice, provided with overwind protection if power operated, and provided with an identification plate.

(2) The maximum load that a lifting device may carry shall be established by its designer.

(3) A notice showing the maximum established load shall be posted in a location visible to the operator and, except during testing, it shall not be exceeded.

(4) Each component that may affect the safe operation of a lifting device shall be examined and tested by a qualified person before initial use and thereafter at intervals not exceeding one year, and a record shall be kept showing the dates, findings and names of the qualified persons performing the examinations and tests and the record shall be kept available for inspection.

(5) Where a combination of lifting devices is used simultaneously, the work shall be supervised by a qualified person.

Install Fire Protection

4.4.10 (1) Fire extinguishing equipment of suitable type and size shall be provided at all fire hazard areas.

(2) A fire suppression system consisting of sprinklers, foam or other suitable means of suppressing fire shall be provided

- (a) in an underground mine on equipment containing more than 10 L of flammable fluids, and
- (b) on the surface, in a building or structure, except a fan house, located above or adjacent to an opening to an underground mine.

(3) At least once each month fire extinguishing equipment, fire suppression systems, fire hydrants, and fire doors shall be inspected by *an* authorized person who shall report in writing his findings to the manager.

Boilers and Pressure Vessels

4.4.11 All boilers and pressure vessels shall be installed and maintained in accordance with CSA Standard B51-M1986 "Boiler, Pressure Vessel and Pressure Piping Code".

Boilers and Engines Near Underground Workings

4.4.12 No part of a steam boiler or stationary internal combustion engine shall be installed within 30 m of any part of the collar of a shaft or openings to underground workings.

Engine Exhausts

4.4.13 *(1)* The exhaust of an internal combustion engine which is temporarily or permanently installed within a building on the surface shall be conducted to a point outside the building and prevented from re-entering the building, entering the intake of any compressor, contaminating the atmosphere of another building, and contaminating mine workings.

(2) No internal combustion engine shall be used in potentially hazardous areas, as defined in the Canadian Electrical Code, Part 1, of surface mine buildings, unless the manager has first obtained a permit from the mechanical inspector.

Fans for Supplying Underground Ventilation

4.4.14 All fans supplying ventilating air to underground workings and all structures containing fans shall be of non-combustible construction, installed at the surface except in the case of auxiliary or development fans, and

(1) provided with means for reversing the direction of air flow, and

(2) the flow shall not be reversed without the manager's authorization.

Main Surface Ventilating Fans

4.4.15 (1) Where explosive atmospheres may exist in underground workings, the main surface ventilating fans shall

- (a) be offset not less than 5 m from the nearest side of the mine opening and be equipped with non-combustible air ducts,
- (b) be provided with explosion doors, and
- (c) be operated from a dedicated power circuit.

(2) Notwithstanding subsection (1), a fan may be located directly in front of, or over, a mine opening if

- (a) the opening is not in a direct line with possible air blasts coming out of the mine in the event of an explosion, and

(b) there is another opening not less than 5 m, or more than 30 m, from the fan opening that is in a direct line with possible air blasts and is equipped with explosion doors.

Elevators

4.4.16 (1) All elevators shall be installed and maintained in accordance with CSA Standard CAN3-B44-M85 "Safety Code for Elevators, Escalators, Dumbwaiters, Moving Walks and Freight, Platform Lifts".

(2) Notwithstanding (1) above, all elevator cars and counterweights shall be provided with overspeed control.

(3) Prior to initial operation, and thereafter at 12 month intervals, all drive components shall be subjected to non-destructive tests as prescribed by the chief inspector.

(4) A maintenance record shall be kept listing all unsafe conditions reported and the repairs made to each elevator to correct unsafe conditions. This record shall be retained at the mine until abandonment or removal of the elevator.

Conveyor Belts

4.4.17 (1) No person shall ride on a conveyor belt.

(2) No person shall cross a conveyor belt except at an established foot bridge not less than 500 mm in width equipped with guardrails.

(3) Every conveyor way shall be provided with a walkway or other acceptable access for maintenance and inspection purposes.

(4) Every accessible section of a conveyor shall be provided with a pull cord to stop the conveyor in an emergency and the controls shall be arranged so that they have to be reset manually before the conveyor can be restarted after an emergency stop.

(5) On every conveyor which can be started automatically by remote control or where the operator has limited visibility of the whole conveyor, an audible start up warning device shall be installed and there shall be a time delay of at least 10 seconds between the end of a 10 second warning and conveyor start up.

(6) All head, tail, drive, and tension pulleys of a conveyor shall be effectively guarded at their nip points and the guards shall extend for a distance of at least 1 m from the nip point.

(7) A belt conveyor used underground, or a belt conveyor more than 15 m in length installed in a building, or other closed-in structure, shall be provided with a belt slip detection device to stop the drive motor in the event of belt blockage or slippage, and when required by the inspector, with an effective sprinkler system ***and plugged chute switches which shall stop the conveyor when a plugged chute condition occurs.***

Cleaning Up Spillage

(8) Servicing, or cleaning up spillage, on or around a moving conveyor belt shall only be carried out

(a) where the conveyor system is so constructed that the work can be done safely and without removing any protective fences or guards, and

(b) by persons who have been fully trained and authorized by the manager to do the work.

(9) When it is necessary to remove protective fences or guards for servicing or cleanup, the conveyor shall be stopped and locked out in accordance with sections 4.11.2 to 4.11.7 of this code.

(10) All guards or fences removed during cleanup or servicing shall be replaced before the locks are removed and the conveyor is started.

(11) The manager shall develop safe work procedures for any work near moving conveyors and submit ***any major or significant changes to established safe work procedures*** to the chief inspector for approval and these procedures shall

(a) address specific problems associated with each conveyor at the mine and indicate the speed at which each conveyor travels, and

(b) for cleanup of spillage, include a safe procedure or mechanism for return of material to a moving belt, and a procedure or mechanism to allow the removal of materials lying below the conveyor that protects persons from contact with the moving parts of the conveyor and any material that may fall from the conveyor.

(12) Conveyor belting for use in the transportation of coal or in an explosive atmosphere and in all underground locations shall meet the requirements of CSA Standard CAN/CSA-M422-M87 "Fire Performance and Antistatic Requirements for Conveyor Belting" ***or an equivalent standard subject to approval by the chief inspector.***

Steam and Compressor Plant Operation

4.4.18 (1) The manager shall ensure that procedures for the safe operation of a steam or compressor plant are prepared in writing and made available to persons operating and maintaining the plant.

(2) Steam and compressor plants shall conform to the requirements of the *Power Engineers, Boiler and Pressure Vessel Safety Act.*

(3) A steam boiler or compressor to which the *Power Engineers Act* does not apply shall be maintained in a proper and safe condition by a qualified person.

Compressors

4.4.19 An air compressor driven by a prime mover exceeding 30 kw, that is lubricated by oil and discharges to a closed system at a pressure greater than 100 kPa, shall have temperature shutdown devices, acceptable to the chief inspector, installed at the high-pressure discharge pipe.

Mine Air Heaters

4.4.20 (1) The installation of mine air heating equipment authorized by section 6.20.1 of the code, including provisions for mounting, clearances, and air supply, shall conform to the requirements of the following standards as amended from time to time

(a) CSA Standard B139-1976, "Installation Code for Oil Burning Equipment",

(b) CAN/CGA-B149.1-M86 "Natural Gas Installation Code",

(c) CAN/CGA-B149.2-M86, "Propane Installation Code",

(d) CSA Standard C22.1-1986, "Canadian Electrical Code, Part I", and

(e) CSA Standard B51-M1986, "Boiler Pressure Vessel, and Pressure Piping Code".

(2) With the exception of embedded pipes or ducts, all parts of the heating system shall be readily accessible for inspection, maintenance, repair, and cleaning.

(3) The heating system shall be protected from freezing.

(4) A carbon monoxide detector, capable of detecting concentrations below 50 ppm, shall be installed to shut down the heater if carbon monoxide in excess of 50 ppm is detected. This detector shall be installed 15 m downstream from where the heated air enters the mine.

(5) Pipelines with gas pressures in excess of 3.45 kPa shall not be located within 15 m of any mine opening.

(6) Pressure regulating stations shall be clearly marked and protected from physical damage.

(7) Propane storage tanks shall be located such that a leak of its contents shall not enter any mine openings.

(8) A vibration switch shall be mounted on the fan cage that will shut down the heater at prescribed vibration limits.

Portable Ladders

4.4.21 Portable ladders shall meet the requirements of CSA Standard CAN3-Z11-M81 "Portable Ladders" or other standard acceptable to the chief inspector.

Construction of Portable Ladders

4.4.22 Where portable wooden ladders are constructed and used at a mine

(1) the side rails shall measure not less than 38×89 mm (nominal 2″×4″) for ladders up to 5 m in length and not less than 38×140 mm (nominal 2″×6″) for ladders over 5 m in length,

(2) the cleats (rungs) shall be solid lumber not less than 21×89 mm (nominal 1″×4″) spaced not more than 300 mm apart, secured in place by nails and with filler blocks of equal thickness to the cleat,

(3) the width between the side rails shall not be less than 380 mm or more than 500 mm, and

(4) a double cleat ladder shall have 3 side rails, evenly spaced, be not less than 1 070 mm and not more than 1 270 mm in total width, and have cleats that extend the full width of the ladder, and

(5) material used for a ladder shall be of #2 grade or better from the following groups: Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir or Coast-Sitka-Spruce; all lumber shall be graded to the National Lumber Grades Authority Rules or other approved grading rules.

4.4.23 Only transparent, protective coatings shall be applied to wooden ladders.

4.4.24 A portable single or extension ladder shall be held, tied or otherwise secured against slipping. The ladder shall extend at least 1 m above any upper landing to which it provides access.

4.4.25 No person shall work from the top two rungs or cleats of a single or extension ladder or the top two steps of a step ladder.

Extension Ladders

4.4.26 The sections of portable extension ladders shall be latched securely when in the extended position. The overlap of sections shall not be less than 1 m unless otherwise specified by the manufacturer.

Fixed Ladders

4.4.27 Fixed ladders shall meet the requirements of the American National Standards Institute (ANSI) Standard A14-3-1974 "Safety Requirements for Fixed Ladders" or other standard acceptable to the chief inspector.

4.4.28 Individual rung ladders for precast reinforced concrete manholes shall be installed as required by American Society for Testing and Materials, Specification C478.

Piping Systems Buried Lines

4.4.29 (1) Piping systems containing substances hazardous to workers because they are corrosive, toxic, flammable or containing an expansible fluid, as defined in the **Power Engineers and Boiler and Pressure Vessel Safety Act,** ***under pressure shall be identified by a labelling or marking system satisfactory to the district inspector.***

(2) Workers shall be trained to identify the labelling.

(3) The marking or labelling shall be maintained in a legible condition.

4.4.30 Any new installations and where identifiable, any existing buried pipelines, power cables and storage tanks shall be plotted on accurate surface mine plans and where required by the inspector, identified by a system of stakes or signs on the surface acceptable to the inspector.

Elevating Work Platforms and Aerial Devices

Standards

4.5.1 Except as otherwise specified, all elevating work platforms, other than fire-fighting aerial devices, shall be designed, fabricated, operated, inspected, tested and maintained in accordance with the following standards:

(1) CSA Standard CAN/CSA-C225-M88 "Vehicle-Mounted Aerial Devices", (note that the testing requirements of this standard shall be modified to cover the full range of platform height, rather than the upper 2/3 as specified in the standard),

(2) CSA Standard CAN3-B354.1-M82 "Elevating Rolling Work Platforms",

(3) CSA Standard CAN3-B354.2-M82 "Self-Propelled Elevating Work Platforms for Use on Paved/Slab Surfaces",

(4) CSA Standard CAN3-B354.3-M82 "Self-Propelled Elevating Work Platforms for Use as "Off-Slab" Units",

(5) CSA Standard CAN3-B354.4 "Boom-Type Elevating Work Pla[illegible],

(6) CSA Standard B335.1-1977 "Low Lift and High Lift Trucks" with respect to order-picker trucks,

(7) manufacturer's instructions, and

(8) other standards acceptable to the chief inspector.

Forklift Truck Platforms

4.5.2 Work platforms mounted on forklift trucks and not conforming to section 4.5.1 may be used for emergency or infrequent operations if they are secured to the fork carriage and meet the requirements of section 4.5.3.

Guard Rails

4.5.3 Elevating work platforms and all similar aerial platforms shall have

(1) standard guardrails on all open sides or be enclosed to provide equivalent protection (toe-boards may be omitted at the access openings),

(2) guards to protect the occupants from the elevating machinery, and

(3) signs clearly indicating the safe maximum working load.

Non-destructive Testing

4.5.4 All vehicle mounted aerial devices and self-propelled boom-type elevating work platforms shall have critical components non-destructively tested by an agency or person acceptable to the chief inspector, prior to their introduction to a minesite, and at intervals not to exceed 12 months.

Electrically Insulated Aerial Device

4.5.5 Any aerial device or component thereof that is stated by the manufacturer as being electrically insulated shall be tested annually to ensure that it meets the requirements of CAN/CSA-C225-M88 "Vehicle-Mounted Aerial Devices".

4.5.6 Any defects found during the tests required by sections 4.5.4 and 4.5.5, shall be repaired in accordance with instructions issued by a professional engineer before being returned to service.

Logbook

4.5.7 A logbook shall be maintained for each vehicle-mounted aerial device and self-propelled boom-type elevating platform in which any defect, operating difficulty, inspection, test, maintenance, modification and repair work is to be recorded. All entries shall be dated and signed by the person responsible for the work.

Controls

4.5.8 An elevating work platform shall have

(1) "deadman" type controls positioned or protected against inadvertent operation,

(2) an emergency stop control on the platform which effectively de-energizes all systems,

(3) clearly marked overriding controls which enable a person at ground level to lower the platform, and

(4) a warning system, consisting of an intermittent horn or flashing light, which activates automatically during any movement of the platform; this does not apply to truck-mounted units complying with CAN/CSA Standard C225-M88 "Vehicle-Mounted Aerial Devices".

Outriggers

4.5.9 Where an elevating work platform has outriggers, they shall be used in accordance with the manufacturer's instructions.

Carrier Vehicles

4.5.10 Carrier vehicles of work platforms shall be secured against any movement during platform operation.

4.5.11 Before the work platform is elevated, the carrier vehicle shall be levelled as specified by the manufacturer.

4.5.12 Where the motion of an elevated work platform is controlled from the operator station at the base of the machine, the operator shall not leave the controls while a person is on the platform and shall respond only to a designated person on the platform.

Fall Arresting Device to Be Worn

4.5.13 Persons on boom supported work platforms shall wear fall arresting safety belts secured to suitable and substantial anchorage points.

4.5.14 Persons shall not be transported on aerial work platforms while elevated, but may remain on them while minor adjustment movements are made.

Aerial Ropeways

Standards

4.6.1 All aerial ropeways and tramways shall be designed, constructed, maintained, and operated in accordance with CSA Standard CAN3-Z98-M78 "Passenger Ropeways".

Fixed *and Mobile* Equipment — Underground Mines

Diesel Equipment Underground

4.7.1 (1) No diesel engine shall be used in an underground mine unless the manager has first obtained a permit from the mechanical inspector.

(2) A logbook shall be provided to record particulars of each diesel engine including all prescribed requirements.

(3) Gasoline or other volatile fuel shall not be used in the starting mechanism for a diesel engine.

(4) The fuel for a diesel engine shall conform with CAN/CSGB-3.16-M86, "Mining Diesel Fuel", Special Type.

Diesel Equipment Undergound Ventilation

4.7.2 (1) Procedures for the operation and maintenance of diesel-powered equipment shall be drawn-up by the manager and copies posted in conspicuous locations.

(2) A positive flow of ventilating air shall be circulated by mechanical means through every workplace where diesel-powered equipment is operating.

Air Compressors Underground

4.7.3 Every air compressor in an underground mine driven by a prime mover exceeding 25 kW shall

(1) be designed and installed so as to minimize the risk of fire or explosion due to accumulations of carbonaceous deposits in the air discharge lines, and

(2) be provided with shutdown devices that will prevent the operation of the compressor if

- (a) the temperature of the discharged air, cooling water, cooling air or lubricant exceeds the safe operating range specified by the manufacturer, or
- (b) the flow or pressure of the compressor lubricant is below normal.

Shutdown Devices

4.7.4 No shutdown device required by section 4.7.3 (2) shall be capable of automatically restarting the compressor. All the devices shall be regularly tested and not used unless they function correctly.

Flammable Materials

General Requirements

4.8.1 (1) Oil, grease, liquid fuels, and other flammable materials shall not be kept or stored within 30 m of a shaft-house, mine portal or other mine opening, and the natural drainage from the storage area shall be away from the shaft or mine entrance.

(2) Oil, grease, and flammable liquids used in an underground mine with a flashpoint below 52 degrees Celsius shall

- (a) be transported and stored only in metal containers or receptacles or in portable plastic containers approved for petroleum fuels, and
- (b) when stored underground, unless in an approved enclosure, be restricted to a sufficient quantity for
  - (i) the current day's work in the case of volatile, flammable liquids, and
  - (ii) 7 days in the case of oil and grease.

4.8.2 (1) No device for the generation of acetylene gas and no internal combustion engine that uses gasoline, propane or any other volatile substance as a fuel shall be used in an underground mine.

(2) Except when used for burning or cutting, propane or other similar fuel that is heavier than air when in a gaseous state shall not be allowed underground.

(3) When propane or other similar fuel that is heavier than air is being used underground for burning or cutting, the containers for the fuel shall be of a type certified under the *Energy Act* and shall not have a capacity greater than 10 kg.

Fire-resistant Fluids

4.8.3 Fire-resistant fluids meeting the requirements of CSA Standard CAN/CSA-M423-M87 "Fire Resistant Hydraulic Fluids", Category 1 or 2, shall be used in hydraulic systems of greater than 10 L capacity installed on equipment in use underground except in the following cases:

(1) in engine hydraulic systems such as hydraulic valve lifters, hydraulic cooling fan drivers, lubricating system, fuel injection systems, torque convertors, transmissions, and axles, and

(2) in braking systems employing totally enclosed friction elements immersed in a liquid coolant, and in braking systems whose hydraulics are independent of any other hydraulic system.

4.8.4 Flammable materials shall only be stored in areas approved by the manager and designed for such storage.

Mobile Equipment

Back-up Alarm

4.9.1 (1) The manager shall ensure that every unit of rubber tired mobile equipment in excess of 7 000 kg gross vehicle weight and any other piece of equipment, when required by the chief inspector, is equipped with a "back-up" alarm which meets the requirements of SAE J-1446 and SAE J-994. Underground mobile equipment designed for bi-directional use shall be excluded from this requirement.

(2) The alarm shall be clearly audible above the background noise at the workplace and it shall continue as long as the equipment is moving in reverse.

(3) Actuation of the alarm shall be automatic and independent of the operator.

Transmission Interlock

4.9.2 Every unit of mobile equipment having a fluid drive transmission shall be equipped with an interlocking system to prevent the unit from being started and put into motion unless the transmission selector is returned through the neutral position.

Fire Extinguisher

4.9.3 Every vehicle and every other unit of mobile equipment shall carry at least one fire extinguisher of adequate size and of the proper type.

Vehicle Requirements

4.9.4 (1) All rubber tired mobile equipment over 7 000 kg gross vehicle weight shall have a minimum of two wheel chocks which shall be used whenever necessary.

(2) All mobile equipment shall have

(a) windshields, side and rear windows, and rear vision mirrors which shall be kept in such condition as to provide clear visibility, and the glazing material shall meet the specifications of ANSI Standard Z26.1 "Safety Glazing Materials for Glazing Motor Vehicles" or other standard acceptable to the chief inspector,

(b) defrosting and defogging devices and windshield washers,

(c) a firmly secured seat for the operator and any authorized passenger, well maintained in a comfortable, shock absorbing condition,

(d) approved safety seat belts, and

(e) suitable clearance lights and reflectors.

4.9.5 A vehicle, other than a vehicle used directly for production in an operating open pit, shall, ***additional to that equipment required for highway driving,*** be equipped with

(1) a whip antenna that is fitted with a flag and lamp high enough to be visible to the drivers of all production vehicles, or

(2) a flashing light mounted above the cab of the vehicle.

Fire Suppression

4.9.6 (1) All mobile equipment capable of containing more than 25 L of flammable fluids and used in underground mines shall be fitted with a multi-nozzle fire suppression system which operates automatically in the event of a fire. Manual activation of the system shall also be possible from each side of the machine and at the operator's station.

(2) Actuation of the fire suppression system shall also cause engine shutdown.

(3) A shutdown override system may be installed and maintained to allow the operator to temporarily suspend automatic fire suppression system actuation and engine shutdown. (Ref. 4.9.25)

Transportation of Persons

4.9.7 Vehicles regularly or primarily used as personnel carriers shall

(1) be of a design and construction acceptable to the chief inspector,

(2) have rear or side doors equipped with latches operable from the inside and outside,

(3) have all doors closed and latched while the vehicle is in motion,

(4) have at least one emergency exit, located on the side opposite the regular entrance door or at the rear of the vehicle, fitted with a latch operable from inside and outside, and

(5) not use curtains as side walls or doors,

(6) when there is a bulkhead between the driver and the passengers, be provided with a window that can be opened from either side, or other means of effective communication,

(7) be provided with non-slip access steps and functional handholds for ease of entry, and adequately illuminated and ventilated, and

(8) have a well constructed and properly secured seat, at least 400 mm wide for each passenger.

Personnel Carriers and Hazardous Materials

4.9.8 (1) Every personnel carrier shall be inspected each day by an authorized person before being used to transport persons, and if any defects are found which could affect the safe operation of the vehicle they shall be corrected before it is used.

(2) Where it is necessary to transport hazardous materials on a personnel carrier at the same time as persons, the materials shall be in an isolated compartment, adequately ventilated and drained, and accessible only from outside of the vehicle. If the compartment is inside the vehicle, it shall be separated from the passenger section by an approved firewall.

Non-destructive Testing of Front Wheel Spindles

4.9.9 (1) The front wheel spindles of every open pit vehicle with a gross vehicle weight in excess of 100 000 kg and having a maximum speed in excess of 20 km/h, and every haul truck with a gross vehicle weight in excess of 45 000 kg, shall be subjected to a non-destructive test at least once a year or at frequencies required by the mechanical inspector.

(2) When a fatigue crack is discovered or known to exist on a front wheel spindle of any vehicle one of the following measures shall be taken:

(a) where the crack has a length of 25 mm or greater, the vehicle shall be taken out of service until the flawed spindle has been replaced by a sound one, and

(b) where a crack is less than 25 mm in length, the vehicle may remain in service under the accepted responsibility of the mine manager, but the affected spindle shall be non-destructively tested at intervals not exceeding three months, or 1,000 hours, whichever is less.

(3) A copy of the results of non-destructive tests showing any defects in the front wheel spindles shall be submitted to the mechanical inspector and a complete record of the results of all non-destructive tests on front wheel spindles shall be maintained at each mine.

Data Plate

4.9.10 (1) No truck, loader or, if required by the inspector, any other rubber tired vehicle shall be operated within a mine unless there is affixed to the inside of the cab, at a place clearly visible to the operator, a nameplate of the vehicle manufacturer showing the serial number and maximum rated load capacity of the vehicle.

(2) Where a truck or scraper or, when required by the mechanical inspector, any other rubber tired vehicle, has a gross vehicle weight in excess of 45 000 kg, the name plate referred to in subsection (1) shall also show the maximum allowable speeds at the rated gross vehicle weight that the retarder and/or braking system is designed to accommodate when travelling on

(a) the maximum downgrade on which the vehicle is designed to operate, and

(b) not less than 2 other specified slopes between such maximum downgrade slope and level ground.

Braking and Steering Design

4.9.11 (1) Unless previously qualified for use by the chief inspector, every truck, loader or other rubber tired vehicle when newly put into service and having a manufacturer's gross vehicle weight in excess of 45 000 kg shall have its braking and steering system design submitted to and accepted by the chief inspector.

(2) Every truck, loader or other rubber tired vehicle having a manufacturer's gross vehicle weight in excess of 45 000 kg shall have any modification affecting the braking, steering or resulting in an increase to the weight carrying capacity approved by the chief inspector.

(3) The manager of a mine shall notify the chief inspector in writing prior to newly placing into service a truck, loader or other rubber tired vehicle having a manufacturer's gross vehicle weight in excess of 45 000 kg.

Rollover Protective Structures

4.9.12 (1) A loader, grader, scraper, tractor, compactor roller, skidder, rough terrain fork lift, bulldozer, and off-highway haul truck introduced into service after July 1, 1991, and when required by the inspector, any other vehicle, shall be equipped with a rollover protective structure that conforms with any of the following standards

(a) Society of Automotive Engineers, Standard SAE-J1040 April 1988 "Performance Criteria for Rollover Protective Structures (ROPS) For Construction, Earthmoving, Forestry and Mining Machines",

(b) "Earthmoving Machinery Rollover Protective Structures — Laboratory Tests and Performance Requirements ISO 3471, or

(c) Canadian Standards Association, Standard B352-M1980 "Rollover Protective Structures (ROPS) for Agricultural, Construction, Earthmoving, Forestry, Industrial, and Mining Machines".

(2) Where the mobile equipment referred to in subsection (1) is designed mainly for underground use, a ROPS designed by a registered professional engineer may conform to Clause 6 of the standard referenced in subsection (1) (c) but does not require physical testing.

4.9.13 (1) The following information shall be permanently marked on rollover protective structures

(a) the name and address of the manufacturer or the registered professional engineer who certified the ROPS,

(b) the model and serial number,

(c) the make, model, and series of the machine for which the rollover protective structure is designed, and

(d) where the ROPS has been designed and constructed in accordance with section 4.9.12 (2), the notation "Underground Use Only" shall be added.

(2) Seat belts of a type conforming with the recommended practice of the Society of Automotive Engineers SAE-J-386 "Operator Restraint Systems for Off-Road Work Machines" shall be installed in all mobile equipment fitted with a rollover protective structure and the operator of the equipment shall wear the seat belt when operating the equipment.

Rollover Protective Structures ROPS

4.9.14 (1) No addition, modification, welding or cutting of a ROPS shall be permitted except in accordance with the instructions of a registered professional engineer and all modified ROPS shall be permanently marked to show the modifications made, the date of re-certification and the name and address of the certifying engineer.

(2) A registered professional engineer may re-certify a damaged, deformed or deteriorated ROPS, after repairs have been made, if he is satisfied that the structural integrity has not been impaired.

(3) ROPS shall be designed and fitted so as not to restrict the operator's field of vision.

Tires and Rims

4.9.15 (1) The manager shall ensure that procedures acceptable to the mechanical inspector are in place for the inspection and any work on tires and rims of equipment.

(2) A tire shall not be installed on any damaged, broken, bent or heavily rusted rim assembly and mismatched parts of rims and wheels shall not be used.

(3) No person shall work on tires and rims unless qualified.

Securing of Equipment

4.9.16 (1) Trucks with dump boxes shall be equipped with a permanently attached device for securing or locking the box in a raised position, or carry suitable equipment on board for this purpose.

(2) No person shall place himself beneath the raised box of a dump truck, bulldozer blade, scraper blade, loader bucket or similar equipment unless it is securely and adequately blocked or otherwise secured independently of the normal operating controls.

Brakes

4.9.17 (1) Every motor vehicle shall have

(a) a service braking system,

(b) a parking brake system, and

(c) an emergency stopping system which may be provided by (a) or (b).

(2) Each braking system shall be capable of being tested independently, and readily applied by a person seated in the driver's seat.

(3) When required by the inspector, an independent means of retardation shall be provided in addition to the requirements of subsection (1).

(4) Rubber tired, self-propelled underground vehicles shall meet the requirements of CAN/CSA-M-424.3-90 "Braking Performance — Rubber Tired, Self-Propelled Underground Mining Machines".

(5) A motor vehicle using air, air-over-hydraulic or full-power hydraulic brakes shall have a suitable warning device that will alert the driver whenever the available brake pressure drops to, or below, its lowest safe operating pressure.

(6) No motor vehicle fitted with hydraulically actuated service brakes shall be put into use for the first time unless the hydraulic system is split into 2 or more separate and independently operated circuits, each of which is capable of safely stopping and holding the vehicle under any operating condition of load, grade, and speed and an alarm device is provided in the cab of the vehicle to warn the operator of a failure of a hydraulic circuit.

Parking Brake

4.9.18 Every motor vehicle shall be equipped with an effective, mechanically activated parking brake, the holding power of which is not is not affected by loss of fluid or air pressure from the braking system and that requires a force to fully activate it of not more than

(1) in the case of a hand operated system, 400 N and,

(2) in the case of a foot operated system, 700 N.

Common Components

4.9.19 (1) On any vehicle where components that apply the service brakes and the emergency brakes are common, the components shall be arranged so that a failure in a common component does not reduce the capability of one of the systems to stop the vehicle safely.

(2) Before being put into service, tests shall be conducted on a vehicle for the proper operation of the service brakes, emergency brakes, parking brakes, retardation systems, steering, warning devices, and lighting.

Brake Testing (New Vehicles)

4.9.20 A dump truck having a manufacturer's rated gross vehicle weight in excess of 45 000 kg, and any other vehicle when required by the chief inspector, shall not be put into service unless a certificate is available from the manufacturer confirming that an identical vehicle has been subjected to and has met the standards for downgrade brake tests as follows

(1) the test vehicle shall conform in all respects to the specifications of the manufacturer,

(2) the vehicle shall be loaded to the manufacturer's maximum gross vehicle weight that shall be verified by weighing,

(3) the tests shall be conducted on a downgrade slope of uniform grade of between 8% and 10%,

(4) the test course shall consist of a hard surface with a well compacted base. There shall not be more than a 3% grade at right angles to the direction of travel,

(5) auxiliary retarding devices shall not be used during the brake tests,

(6) stopping distances shall be measured from the initial point of application of the service brakes to the final stopping position from the following speeds:

(a) 16+3 km/h

(b) 24+3 km/h

(c) 32+3 km/h
(d) 40+3 km/h
(e) 48+3 km/h
(f) >57 km/h

and for each of the tests the stopping distance shall not exceed that given by the following formula,

$$s = \frac{V^2}{48-(2.6\times d)}$$

where s=stopping distance in metres
v=initial speed at brake application in kilometres per hour
and d=percentage downgrade of the test ramp

(7) no more than 20 minutes shall elapse between each of the tests,

(8) actuating fluid pressures on each of the brakes shall be within the manufacturer's specification range during the tests, and where practicable brake path temperatures shall be recorded immediately after each test, and

(9) the mechanical inspector shall be notified, at least one month prior to the scheduled date of such tests.

Brake Testing (Annual)

4.9.21 (1) Trucks having a manufacturer's rated gross vehicle weight in excess of 45 000 kg shall be subjected to downgrade braking tests such that at least once a year 50% of the fleet is tested, and every truck in the fleet is tested at intervals not exceeding 3 years. The tests shall be as follows

(a) the vehicle shall be loaded to the manufacturer's maximum permissible gross vehicle weight,

(b) the tests shall be conducted on a well-graded hard packed downgrade slope of uniform grade of between 8% and 10% or where there is no downgrade slope satisfying this condition, tests shall be conducted on the maximum downgrade slope over which the trucks are operated,

(c) auxiliary retarding devices shall not be used during the brake tests,

(d) stopping distances shall be measured from the initial point of application of the service brakes to the final stopping position, from an initial speed of 40 km/h, and the minimum acceptable brake performance shall be as follows:

Initial Speed 40 km/h

Grade	Stopping Distance
10%	84 m
9%	76 m
8%	68 m

(e) actuating fluid pressures on each of the brakes shall be recorded during the tests, and brake path temperatures, where practicable, shall be recorded immediately after each test, and

(f) copies of all test results shall be sent to the mechanical inspector as soon as possible after completion of the tests.

(2) Where a vehicle fails to meet the minimum brake performance standards specified under subsection (1) (d), it shall be removed from service until corrective measures have been taken and the vehicle meets the standard.

(3) Notwithstanding 4.9.21 (1) the mechanical inspector may require any other vehicle to be brake tested.

Auxiliary Braking (New Vehicles)

4.9.22 (1) The braking system of a rubber tired vehicle shall be designed and constructed so that in the event of a single failure of a connecting or transmitting element, other than the operating pedal of a vehicle equipped with a split hydraulic braking system, the vehicle can be brought to a complete stop when loaded to its rated gross vehicle weight and on the steepest downgrade over which it operates, from a speed that is one and a half times the maximum speed indicated for that grade on the traffic control scheme required under section 6.1.3 (5) of the code within the following distances

(a) for a vehicle with a rated gross vehicle weight of not more than 9 000 kg, within 72 m,

(b) for a vehicle with a rated gross vehicle weight more than 45 000 kg, within 123 m, and

(c) for any other such vehicle within the distance found from the formula

$$1.4\,W + 60$$

where W equals the rated gross vehicle weight in tonnes.

(2) The braking effort of the retarders shall not be considered in meeting the requirements of subsection (1), unless the retarder is completely separate and independent of the brake system.

Separation of Braking and Steering Systems

4.9.23 Where braking and steering systems are activated by hydraulic pressure and where portions of both systems use common components, no single component failure in one system shall adversely affect the other system.

Auxiliary Steering

4.9.24 (1) Where a rubber tired vehicle depends on power for steering and the loss of power might prevent the vehicle from being steered manually, an auxiliary device shall be installed that will enable the driver to steer the vehicle for a sufficient period of time to bring it to a safe stop.

(2) Where an auxiliary hydraulic pump is used to provide the emergency steering capability, the hydraulic fluid supplied to the pump shall be taken from a separate reservoir or from an isolated section of the main reservoir.

(3) Rubber tired vehicles, restricted to underground use and having a maximum speed of 20 km/h, do not require auxiliary steering.

(4) Every auxiliary steering system put into service shall conform to the requirements of Recommended Practice SAE-J53 "Minimum Performance Criteria for Emergency Steering of Wheeled Earthmoving Construction Machines" issued by the Society of Automotive Engineers.

Automatic Engine Shutdown

4.9.25 (1) Where automatic engine shutdown devices are employed on vehicles, audible and visual alarms shall be installed in the operator's cab to pre-warn the operator that an automatic engine shut-down is imminent.

(2) When an automatic engine shutdown occurs, auxiliary steering systems shall be automatically activated.

(3) A shutdown override system shall be installed and maintained to enable the operator to temporarily suspend automatic engine shutdown in order to bring the vehicle to a safe stop.

Trackless Diesel Powered Equipment

4.9.26 Trackless diesel-powered equipment for use in

(1) underground coal mines shall comply with CSA Standard CAN/CSA-M424.1-88, "Flame-Proof Non-Rail Bound Diesel-Powered Machine for Use in Gassy Underground Coal Mines" except where otherwise required by the code, and

(2) underground mines, other than coal, shall comply with CAN/CSA-M424.2-90 "Non Rail Bound Diesel-Powered Machines for use in Non Gassy Underground Mines".

Railways

Trains — Fitments

4.10.1 (1) All trains shall be equipped with suitable tail lights and clearance lights.

(2) If trains are required to reverse, they shall be equipped with a suitable beam or flashing tail light and if they are to be reversed frequently and for lengthy distances, a procedure shall be followed which is acceptable to the district inspector.

(3) Every trolley locomotive shall be operated with the trolley pole in the trailing position, unless there is no room to reverse the pole, in which case speed shall not be more than walking speed.

(4) A car shall not be pushed by a locomotive if material extends beyond the length of the car.

(5) Each locomotive shall be equipped with suitable fire extinguishers in serviceable condition.

(6) Nothing shall be placed on the top of a locomotive unless it is necessary for its operation and, in that case, it shall be adequately secured, must not extend beyond the ends or sides of the locomotive or into the cab area, and must not obstruct the operator's view.

4.10.2 An engine, locomotive, or trolley car used for hauling material shall be equipped with

(1) properly maintained headlights and clearance lights,

(2) an audible warning system, which shall be sounded by the operator to warn persons when they may be endangered by movement of the locomotive or train, and whenever the locomotive or train is about to move.

Control Levers

4.10.3 Every storage battery and trolley haulage locomotive shall be equipped with a "deadman" control switch and with a control lever so installed that the lever cannot be removed when the power is on.

Unattended Locomotives

4.10.4 (1) No person shall leave an electric haulage locomotive unattended unless the brakes have been set, the control lever placed in the park position, and the main switch placed in a non-operating position.

(2) Subsection (1) does not apply if the locomotive is on automatic control and approval for the control has been obtained from the chief inspector.

(3) When operated by remote control or by an automated system, it shall be arranged that in the event of any failure of the control or system, the locomotive and cars will be brought to a stop immediately.

Railways — Procedures and Practices

4.10.5 (1) The manager shall issue standard practices to govern the safe operation of a standard gauge railroad, including all equipment used on the track for maintenance and transport.

(2) A copy of the standard practices prepared in accordance with subsection (1) shall be provided to each railroad worker, who

(a) shall be trained and instructed in, and be knowledgeable of, the standard practices for his work, and

(b) shall have a copy of the standard practices readily available while on duty.

(3) Where a railroad of a mine or mining plant connects with a railroad of a railway company, standard operating procedures shall be established and followed.

(4) On surface a low bridge warning sign shall be installed where the clearance between the underside of a structure and the top of any railway car is less than 2 m.

(5) A locomotive shall be equipped with brakes in proper working condition, and have the control lever mounted so as to prevent its inadvertent removal.

(6) Before leaving a locomotive unattended on a grade, the operator shall use hand brakes or wheel chocks to prevent movement of the locomotive.

(7) Before installing remote or automatic controls for the operation of a locomotive, the approval of the chief inspector shall be obtained.

(8) The manager shall issue a standard practice for the use of radio communications systems used on a railroad.

(9) Only authorized persons shall ride on a train.

(10) One or more persons shall direct the operator of a locomotive when backing a train in a location where persons may be endangered.

(11) Where a locomotive is engaged in a shunting operation in excess of 500 m, the inspector may require the locomotive to always precede the train.

(12) A car shall not be permitted to run free unless under adequate control, and there is no hazard to any person.

Lock-Out Procedures

Lock-Out Procedures

4.11.1 (1) The manager shall develop a lock-out procedure which includes but, is not limited to, the requirements of section 4.11.2 to section 4.11.7, inclusive. and he shall ensure that all persons required to lock-out machinery or equipment are adequately trained in the procedure and that a written copy of it is made available to them.

(2) Notwithstanding subsection (1) where a large number of persons is involved, the manager may develop a lock-out procedure, acceptable to the chief inspector and the OHSC, that modifies the requirements of 4.11.4 and 4.11.5.

(3) The lockout procedure developed in 4.11.1(1) should address the event that a lock has not been removed and the shift has ended.

Power to Be Cut Off

4.11.2 (1) Before any work is performed on electrical equipment, the main power source shall be disconnected, locked-out and tagged.

(2) Where equipment to be worked on is powered by a source other than electricity, the power supply shall be shut off, locked-out and tagged. A means shall be provided to safely release the stored energy from the equipment before any work begins. If a valve in a pipe could leak and allow water, steam, compressed air or other potentially hazardous substance to reach persons working on the equipment, the pipe shall be blanked off, or otherwise isolated, in accordance with the lock-out procedure.

Locks and Tags

4.11.3 (1) Locks and tags shall be issued to each person who works on machinery or equipment that has to be locked-out.

(2) A lock issued to any person shall only be capable of being opened by that person's key except that where a number of locks are issued to a person for his sole use, they may be mastered to a single key.

(3) Tags issued to individual persons shall contain space for the recording of the person's name, the type of work being performed, the date and time the work was started and the name of the supervisor in charge.

Affixing and Removal of Locks and Tags

4.11.4 (1) Each person who works on machinery or equipment requiring to be locked-out shall be responsible for affixing his own lock and tag to the lock-out device and for removing them on the completion of his work.

(2) The person who affixes the first lock in the lock-out procedure shall, before the work begins, attempt to start the equipment or machinery to ensure that it is properly locked-out.

(3) A lock shall only be removed by the person who affixed it to the lock-out device.

Overlap Between Shifts

4.11.5 (1) When machinery or equipment is locked-out, employees coming on shift shall place their own locks on the lock-out device before the employees going off shift remove theirs.

(2) A supervisor may lock-out the machinery or equipment during a shift change to allow employees going off shift to remove their locks.

Procedure Before Work Recommences

4.11.6 When work is completed on locked-out machinery or equipment, and before any locks or tags are removed, all guards, fences and other safety devices shall be replaced.

Watchman's Responsibilities

4.11.7 In the event that the machinery or equipment cannot be locked-out, a tag shall be affixed and a watchman shall be posted at a location where he can prevent anyone from re-energizing the power supply and starting the machinery or equipment. The watchman shall have no other duties at the time and he shall remain at his post until told by the supervisor that he may leave.

Lifting Devices — General

(Bridge and Overhead Travelling Cranes, Monorails and Underhung Cranes)

4.12.1 Electrical bridge and trolley conductors shall be located or guarded to prevent accidental contact by persons.

4.12.2 Each hoist shall have a device to prevent hook travel beyond the safe upper limit at all designed speeds.

4.12.3 Where electrically powered hoisting equipment is operated from cabs, means shall be provided in the cab for the operator to safely disconnect the main power supply under any load condition.

(Manually-Operated Hoists and Winches)

4.12.4 (1) A hand-operated hoist shall have a ratchet and pawl mechanism, load brake, or other means of safely holding the load at any height.

(2) Crank operated winches, not fitted with automatic load brakes, shall have a means of preventing the crank handle from slipping off the crank shaft while hoisting. On such winches, under free wheel conditions, the crank handle shall be removed before the load is lowered.

(Mobile Cranes)

4.12.5 Mobile cranes shall be operated with their turntables level, except as permitted by the manufacturer. Level indicating devices shall be provided and used for this purpose.

4.12.6 (1) Outriggers, when deployed to meet load capacity chart requirements, shall be fully extended and secured against retraction. Outrigger beams shall be marked to indicate their fully extended position and jacks shall be extended sufficiently to bear the whole weight of the crane.

(2) Outrigger floats shall be secured to the outrigger jacks when in use.

4.12.7 Mobile cranes shall be securely chocked on firm ground before any hoisting or lowering begins.

4.12.8 Where required by the chief inspector, any mobile crane that has a lifting capacity exceeding 10 t shall be equipped with a load weight indicator.

(Powered Hoists and Winches)

4.12.9 Air operated hoists and winches shall be supplied with air at sufficient pressure to ensure safe operation. Inadvertent disconnection of air supply hoses shall be prevented.

4.12.10 Electrically operated hoists and winches shall be properly connected to the power supply and grounded in accordance with the Canadian Electrical Code Part 1.

(Rigging and Slings — General)

4.12.11 All rigging, slings and their fittings shall be designed, manufactured, maintained, and used in accordance with the provisions of the code including Volume 3 — Part 4 "Excavation, Construction and Demolition" dealing specifically with excavation, construction and demolition, and similar activities on a mine site. All rigging and slinging work shall be conducted by, or under the supervision of, authorized persons who are familiar with all aspects of the work and with the proper signals.

(Other Hoisting Equipment)

4.12.12 Except as otherwise provided, all cranes, derricks, and other hoisting equipment shall be designed, constructed, erected, maintained, and operated in accordance with the provisions of the code including Part 4 "Excavation, Construction and Demolition" dealing specifically with excavation, construction, and demolition and similar activities on a mine site.

(Cranes General)

4.12.13 A suitable non-destructive test shall be made by a person certified in accordance with the applicable standards of the Canadian General Standards Board 48-GP-4M, 48-GP-7M, 48-GP-8M, and 48-GP-13M on all rigid ***load*** carrying components of mobile cranes and bridge cranes greater than 10 000 kg capacity and any other cranes when required by the inspector, before being put in to service and at subsequent intervals not exceeding 12 months.

(Boom Type Concrete Pumpers)

4.12.14 Boom type concrete pumpers shall be subjected to non-destructive testing of critical components by an agency or person acceptable to the chief inspector, at intervals not exceeding 24 months or 3,000 hours of pumping, whichever is less.

Raise Climbers

(Design and Installation)

Design Details Required

4.13.1 (1) Before installing a raise climber, the district and mechanical inspectors shall be notified and, when required, the manager shall submit the design drawings and technical details of the installation. The submission shall show construction materials, rated load capacities, dimensions, operating controls, and safety features.

(2) The materials and procedures used in the construction of a raise climber shall conform to the requirements of appropriate CSA, ASTM or other equivalent national or international standards as required by the chief inspector.

Certificate Required

4.13.2 (1) A raise climber shall not be put into service unless a certificate is available from the manufacturer, or from a professional engineer, attesting that all critical, load-bearing components of the complete assembly and accessories have been inspected and tested non-destructively by approved methods.

Inspections and Tests

(2) A raise climber that has previously been in use at any place beyond the control of the present manager shall not be reinstalled until the inspections and tests required by subsection (1) have been carried out and the results accepted by the chief inspector.

Identification Plate

4.13.3 Every raise climber shall have a durable and legible identification plate showing

(1) the name of the manufacturer, the date of manufacture, the model number, and a serial number, and

(2) the maximum allowable speed and the maximum allowable load ratings as certified by the manufacturer or a professional engineer.

Brakes Required

4.13.4 (1) Raise climbers shall be equipped with at least 2 separate and independently operated service brakes, each capable of safely stopping and holding the conveyance under all rated conditions of load and speed.

(2) An automatic overspeed brake shall be installed that is capable of bringing the conveyance to a safe stop under any rated load condition from a predetermined overspeed.

(3) Each brake or braking system shall be capable of being tested independently.

(4) Where electro-mechanical brakes are installed, they shall be actuated immediately if the power supply to the climber is interrupted.

Electrically Operated Raise Climbers — Brakes Required

4.13.5 Every electrically driven raise climber shall have at least one service brake that will apply automatically in the event of any interruption of the power supply to the climber, and in such an event, the service brake shall be capable of

(1) being operated manually by persons in the conveyance to lower it safely under continuous control, or

(2) being released manually, provided that another brake is available which can be used by persons in the conveyance to lower it safely under continuous control.

Brake Components

4.13.6 (1) Raise climber brakes shall either be designed to compensate automatically for lining wear or the means for manual adjustment shall be easily accessible.

(2) Brake blocks and linings shall be protected from water, oil, grease or other substances that could adversely affect them.

(3) The design of the braking system shall ensure that a single failure of any component will still leave sufficient braking capacity to bring the conveyance to a safe stop.

Guards Required

4.13.7 Every raise climber shall have all exposed gearing, chain drives, couplings, or any moving or rotating parts, that could endanger a person who inadvertently comes into contact with them, effectively guarded or otherwise protected.

Controls

4.13.8 (1) All operating controls of a raise climber shall be located in a convenient position to allow for their safe operation.

(2) An emergency switch shall be provided in the cab of every electrically operated raise climber that will cut off the power supply to the drive motors if the main control contactor fails to open, or in any other emergency situation.

Electric Fittings

4.13.9 (1) All electrical equipment, including switches, connectors, wiring and cables shall be designed, installed and weather-proofed to ensure the safety of the raise climber under any operating conditions.

(2) An electrically powered raise climber shall not be operated in excess of 750 v, and shall be protected by a ground fault system.

(3) The operating controls and electrical panels of an electrically driven raise climber shall be capable of being locked-out to prevent unauthorized operation.

Conveyance Requirements

4.13.10 Raise climbing conveyances shall, where practicable, conform with the general requirements for shaft cages.

Guard Rails and Toe-boards

4.13.11 (1) Standard guardrails and toe-boards shall be installed on raise climber work platforms.

(2) A substantial cover shall be provided for any work platform used during raise driving with a raise climber where the inclination is greater than 60 degrees.

Anchoring of Work Platform

(3) A work platform shall be securely anchored to the raise climber guides or rails while persons are working on the platform.

(4) Unless otherwise approved by the chief inspector, only one raise climber conveyance shall be installed in any raise.

Safety Factor

4.13.12 The static factor of safety of every load carrying component of a raise climber and its associated equipment shall not be less than 5 under the maximum rated load conditions.

Bolts to Be Torqued

4.13.13 All bolts used in the assembly of a raise climber shall be of the proper grade and size, as specified by the manufacturer. The bolts shall be correctly torqued in accordance with the manufacturer's specifications and no defective or damaged bolts shall be used. All exposed bolts, and other components, shall be adequately protected against falling rock.

Rack Monitor Required

4.13.14 (1) Only racks and pinions supplied by the raise climber manufacturer, or certified by a professional engineer, shall be used.

(2) All permanent raise climber installations used for the transport of personnel shall be provided with a device to continuously monitor the integrity of the rack ahead of the driving pinions, or with a braking system that operates independently of the rack.

Modifications to Be Approved

4.13.15 Modifications designed to increase the capacity or speed of a raise climber, or modifications that could affect the load carrying capacity of a raise climber or a work platform, shall not be made unless approved by the manufacturer or a professional engineer.

Communication Required

4.13.16 An effective means of communication shall be provided between a raise climber conveyance and the base from which it operates. Where intermediate levels or landings are serviced by the conveyance, the district inspector may require the installation of a suitable signalling system.

Inspection and Tests Before Use

4.13.17 (1) After the installation of a raise climber, and before it is put into service, a final inspection shall be made of the complete installation, and tests shall be carried out by authorized persons. A manufacturer's or professional engineer's manual, showing specifications and test procedures, shall be available for this inspection.

(2) A complete record of the inspections and tests made in compliance with subsection (1), including the results of all tests on the safety devices, shall be entered in the logbook required by section 4.13.19.

Limit of Travel Stops

4.13.18 (1) Whenever a raise climber is operating, the end of the track on which it travels shall be provided with a stop block to prevent the conveyance from being taken beyond the track.

(2) All permanent, electrically driven raise climber installations shall be provided with devices which will automatically stop the conveyance at the upper and lower limits of travel.

(Maintenance and Operation)

Qualified Persons to Maintain Equipment

4.13.19 (1) The manager shall appoint qualified persons to establish mechanical and electrical maintenance schedules for each raise climbing installation, and to ensure that these are carried out in accordance with the manufacturer's recommendations and the provisions of the code.

Records to Be Kept

(2) A record of all prescribed tests, inspections, repairs, and maintenance work carried out, and any defects, damage or problems noted during the inspections or tests, shall be entered in a Raise Climber Logbook which shall be kept at the mine and be available for inspection by an inspector.

Logbook

(3) All entries in the logbook shall be dated and signed by the person who carried out the work, and the supervisor having charge of the installation shall check and countersign the entries at least once each week.

Daily and Weekly Checks

4.13.20 (1) A mechanic shall check an operating raise climber each day to ensure it is operating normally.

(2) At least once each week, a mechanic, and in the case of an electrically driven raise climber, an electrician, shall carry out an inspection of the installation and perform the following tasks

(a) routine servicing in accordance with section 4.13.19 (1), and

Testing Required

(b) test and inspect all safety and protective devices to ensure that they are operating correctly.

(3) Before recommencing operations after a prolonged shutdown, a full inspection of the complete installation shall be carried out by authorized persons.

Annual Non-destructive Tests

4.13.21 At least once a year, or when required by an inspector, any part of a raise climber installation which, if it failed, could endanger persons shall be non-destructively tested by a person certified in accordance with the applicable Canadian General Standards Board 48-GP-UM, 48-GP-7M, 48-GP-8M, 48-GP-9M, 48-GP-13M, "Certification of Non-Destructive Testing Personnel", and a copy of the test report sent to the chief inspector.

4.13.22 Only authorized persons shall be permitted to operate a raise climber.

Operator's Responsibilities

4.13.23 (1) The operator of a raise climber shall ensure that the brakes are in safe working condition at the beginning of his shift and he shall test the overspeed brake at least once each day.

(2) Each day, before normal operations are commenced, the raise climber shall be operated through its full range of movements to ensure that all limit switches, brakes, controls, audio and visual indicators and signals are functioning correctly.

Defects to Be Reported

4.13.24 (1) Where a person carrying out any prescribed inspection or test on a raise climber installation, discovers a defect, fault, malfunction, or any other condition that could affect the safe operation of the equipment, he shall immediately notify the supervisor in charge of the installation and the climber shall not be used until remedial action has been taken and the supervisor authorizes a resumption of work.

Repairs Made in Accordance With Manufacturer's Instructions

(2) Repairs to structural or critical safety components shall only be made according to instructions of the manufacturer or a professional engineer. Welding procedures shall conform to appropriate CSA Standards.

(3) Repairs to a rack or pinion shall only be carried out under the direction of a manufacturer's representative or a professional engineer and the repaired components shall be non-destructively tested in accordance with section 4.13.21, before being returned to service.

Fire Extinguisher

4.13.25 Every electrically driven raise climber shall be provided with a suitable fire extinguisher.

Emergency Procedures

4.13.26 (1) Means shall be readily available to enable persons to descend, if trapped in a raise climber conveyance up a raise, in the event of a power failure or other emergency situation.

(2) The manager shall ensure that operators of raise climbers and, any other persons who would be involved in an emergency descent of trapped persons, are trained in the use of the emergency equipment.

Supervisor to Check Loading

4.13.27 The supervisor in charge of a raise climber installation shall ensure that the maximum permitted load, as specified on the identification plate required by section 4.13.3, is not exceeded.

4.13.28 Except for inspection purposes, no person shall ride on a work platform while it is in motion.

Examination After Blast

4.13.29 When ascending the raise after blasting the operator shall carefully monitor the condition of the guide rail and rack ahead of the conveyance.

Transport of Material

4.13.30 (1) Equipment or material being transported in a raise climber conveyance shall be secured and restrained.

(2) Only persons necessary for the work process shall be transported with explosives, steel, timber, or other material or equipment.

(3) Material or equipment shall not be dropped down a raise from the conveyance.

4.13.31 The electrical supply to an electrically driven raise climber shall be disconnected during preparation for blasting.

Protection at Bottom of Raise

4.13.32 A suitable barrier, and a sign reading "Persons Working Above", shall be installed at the bottom of every raise where a raise climber is operating.

Brakes Applied Before Working

4.13.33 Before any work is carried out from a raise climber work platform, all brakes shall be applied and the safety device shall be attached to the guide rail.

Temporary Work Platforms — General

Definitions

"*building ties*" means a tie-in system of bracing or anchorage from a standing scaffold to a permanent structure.

"*heavy duty*" means it is intended to support both workers and stored or stacked materials, such as bricks and masonry.

"*heavy duty scaffold*" means a scaffold designed and constructed to support a uniformly distributed load not to exceed 3.6 kN per square metre (75 lbs./sq. ft.) plus a point load of at least 2.2 kN applied anywhere on the structure and assumed as being uniformly distributed over an area 450 mm×450 mm (18 inches×18 inches) square.

"*light duty*" means it is intended to support workers and their personal hand tools.

"*light duty scaffold*" means a scaffold designed and constructed to support a uniformly distributed load not to exceed 1.2 kN per square metre (25 lbs./sq. ft.) plus a point load of at least 2.2 kN applied anywhere on the structure and assumed as being uniformly distributed over an area 450 mm×450 mm (18 inches×18 inches) square.

"*scaffold or scaffolding*" means any temporary elevated work platform and its supporting structure used for supporting persons or materials, or both.

"*standard guardrail*" means a guardrail structure comprised of a top rail approximately 1,070 mm (42") above floor level, a toe-board, and a midrail approximately midway between the underside of the top rail and the upper edge of the toe-board. They shall be designed to withstand a load of 900 N (200 lbs) applied, in any direction, and at any point on the top rail.

"*toe-board*" means a metal or wood guard strip, approximately 100 mm in height, placed along the bottom of a guardrail structure, and having a clearance of not greater than 13 mm (½") between its lower edge and the walkway or platform to prevent tools or other material from falling off.

"*work platform*" means an elevated temporary work base for persons.

Temporary Work Platforms — General

Scaffold Requirements

4.14.1 Except as otherwise specified, scaffolds shall meet the requirements of the CAN/CSA Standard S269.2-M87 "Access Scaffolding for Construction Purposes", as amended from time to time, or other standards acceptable to the chief inspector.

Responsibility of the Manager

4.14.2 The manager shall ensure that scaffolds used by any persons at the mine meet the requirements of the code.

Scaffold Erection

4.14.3 (1) All scaffolding shall be erected plumb and level, with the vertical supports resting upon firm foundations or sills.

(2) The use of shore or lean-to scaffolds is prohibited.

Wooden Components in Scaffolding

4.14.4 Unless otherwise specified in the code, wooden components used in scaffolding shall be #2 grade and better lumber, and species to be limited to the following groups: Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir or Coast Sitka Spruce. All lumber shall be graded to the National Lumber Grades Authority Rules or other grading rules approved by the chief inspector.

Roof Platform Guardrails

4.14.5 All work platforms shall have standard guardrails on all open sides and ends, except where the platform is immediately adjacent to a structure that provides equivalent protection and the open space is less than 250 mm.

Wire Rope Guardrails

4.14.6 Wire rope may be used as a guardrail provided

(1) the rope is not less than 10 mm (⅜") in diameter,

(2) the top and intermediate rope is rigged and maintained at the required height and tensioned to provide effective protection,

(3) the rope is supported by vertical members, spaced not more than 2.4 m apart, and

(4) that high visibility coloured markings are attached to the top and intermediate ropes at not more than 1 m intervals.

Scaffold — Electrical Hazard

4.14.7 Any induced electrical charges resulting from the proximity of metal scaffolding to energized electrical conductors shall be removed by grounding.

Work Platforms

Scaffold — Wood Construction

4.15.1 Except as provided elsewhere in the code, solid wood scaffold planks used as work platforms shall

(1) be cut from Douglas Fir, Larch, Hem-Fir, Spruce-Pine-Fire or Coast Sitka Spruce species, or

(2) be cut from graded, select, structural scaffold lumber not less than 38 mm×235 mm actual dimensions, or

(3) be cut from #2 grade and better lumber not less than 48 mm×235 mm actual dimensions, or

(4) be cut from #2 grade and better lumber not less than 38 mm×235 mm actual dimensions provided the planks are doubled, one on top of the other, or

(5) other size and grading standards acceptable to the chief inspector.

Scaffold Planks

4.15.2 (1) Every scaffold plank shall

(a) be inspected by an authorized person before each installation to ensure its effectiveness as a scaffold plank,

(b) be supported at intervals not exceeding 3 m for light duty work and 2.1 m for heavy duty work, and

(c) extend not less than 150 mm beyond the supporting members. If the overhang is used as a working surface, it shall be limited to a maximum of 300 mm.

(2) Work platforms made of scaffold planks shall be not less than two scaffold planks wide, placed side by side, with additional planks as necessary.

Manufactured Planks

4.15.3 (1) Work platforms made of manufactured planks shall provide a work surface with a minimum width of 500 mm.

(2) Manufactured planks shall be designed, fabricated and used to meet the specifications of light or heavy duty work as defined in the code.

(3) Notwithstanding subsection (1), a single, manufactured extension staging (painter's plank) may be used provided it is occupied by only one person.

Sloped Work Platforms

4.15.4 Sloped work platforms shall be sloped not more than 2 vertical to 10 horizontal, secured against dislodgement and fitted with cleats on their upper surfaces at not more than 400 mm intervals unless other effective non-skid measures are used.

Access to Scaffolds

Scaffold Access

4.16.1 Access to otherwise inaccessible working levels of scaffolds up to 9 m in height above a floor or grade shall be provided by

(1) end frames, where the design provides a ladder-like structure having uniformly spaced horizontal members, or

(2) fixed vertical ladders, portable ladders or stairways.

Scaffold Access

4.16.2 Access to otherwise inaccessible working levels of scaffolds over 9 m in height above a floor or grade shall be provided by

(1) a stairway erected for the full height of the scaffold,

(2) a fixed vertical ladder, or

(3) a temporary passenger hoist.

Fixed Ladders

4.16.3 All fixed vertical ladders referred to in sections 4.16.1 and 4.16.2 of the code shall meet the requirements of CAN/CSA Standard S269.2-M87 "Access Scaffolding for Construction Purposes".

Wooden Scaffolds

Scaffold Details

4.17.1 The horizontal spacing of uprights, guardrail posts and bearers of wooden scaffolds shall not exceed

(1) 3 m for light duty scaffolds, and

(2) 2.1 m for heavy duty scaffolds.

Scaffold Uprights

4.17.2 Adjacent uprights shall be connected with horizontal runners (ledgers and bearers) to ensure the unbraced vertical section of an upright does not exceed 2.4 m.

Light Duty Scaffolds

4.17.3 Components of light duty, single-pole scaffolds shall have minimum nominal dimensions as follows

Component	Dimensions (nominal)
Uprights — up to 6.1 m	2″×4″
Uprights — 6.1 to 15.2 m	4″×4″
Bearers — 920 mm max. span	1″×6″ or 2″×6″
Bearers — 1 520 mm max. span	2″×6″
Ledgers	1″×6″ or 2″×4″
Braces	1″×6″ or 2″×4″
Wall scabs and bearer blocks	2″×6″
Minimum platform width	2 — 2″×10″
Guardrails (top and intermediate)	2″×4″
Toe-boards	1″×4″

Double-pole Scaffolds

4.17.4 Components of double-pole scaffolds shall have minimum dimensions as follows:

	Dimensions (nominal)	
Component	Light Duty	Heavy Duty
Uprights		
— up to 6.1 m	2″×4″	2″×6″
— 6.1 to 15.2 m	4″×4″	4″×6″
Bearers 1 520 mm maximum span	2 — 1″×6″ 1 — 2″×6″	2 — 2″×6″ or 1 — 2″×10″
Ledgers	1″×6″	1″×6″
or	2″×4″	2″×4″
Braces	1″×6″	1″×6″
or	2″×4″	2″×4″
Min. Platform Widths	2 — 2″×10″	4 — 2″×10″
Guardrails (top and intermediate)	2″×4″	2″×4″
Toe-boards	1″×4″	1″×4″

Spacing of building ties — vertical 4.6 m and horizontally at every 3rd upright.

Single Upright Extensions

4.17.5 The extension of single uprights shall be by means of butt joints, strengthened by two wooden splice plates not less than 1.2 m long. The splice plates shall have a minimum thickness of 38 mm and shall be of the same width as the spliced member. The combined cross-sectional area of the splice plates shall be at least that of the single vertical upright.

Laminated Uprights

4.17.6 When uprights are fabricated by lamination of two or more pieces of material to obtain the required cross-sectional dimension, the distance between joints shall be at least 1.22 m.

Scaffold Crossbraces

4.17.7 Scaffolds shall be adequately supported in two directions by a system of diagonal cross-braces. Braces shall be secured to the uprights as close as possible to the ledgers.

Bearer Supports

4.17.8 On single-pole scaffolds, the inner ends of bearers shall be supported by bearer-blocks and securely fastened to wall scabs. Manufactured bearer supports shall be of a design acceptable to the chief inspector. Such supports shall be secured to solid wall materials.

Metal Bearers

4.17.9 Metal bearers, incorporating hooks which are engaged in holes in the wall sheathing, shall be adequately supported by stiffeners secured to the sheathing, when such sheathing is plywood of less than 13 mm thickness or other material of lesser strength.

Tubular Metal Scaffolds

Erection

4.18.1 Except as required by section 4.18.2 tubular metal scaffolds shall be erected in accordance with the manufacturer's instructions and specifications. All accessories, including bracing in both vertical and horizontal planes, shall be installed using the specified fasteners. If components made by different manufacturers are used, the manager shall ensure their compatibility and suitability.

Instructions by a Professional Engineer

4.18.2 Scaffold installations shall be erected in accordance with the written instructions of a professional engineer when

(1) the height will exceed 38 m, or

(2) scaffold components are used to support a temporary floor, or

(3) the scaffold may be subject to loads which can cause overturning, or

(4) the scaffold is to be suspended from a structure.

Scaffold Bases

4.18.3 Adjustable height bases shall be used under uprights to accommodate foundation settlement or uneven, sloping or stepped surfaces, and under the uprights of running scaffolds with a height of more than three frames or 6.4 m.

Spacing of Frames

4.18.4 Spacing of frames or uprights shall be consistent with the maximum allowable spans for work platform components and the intended loading.

Height-adjustment Devices

4.18. 5 Unless otherwise specified by the manufacturer, height-adjustment devices shall not extend more than ⅔ of their total length or 610 mm, whichever is less.

Vertical Frames and Uprights

4.18.6 Vertical frames and uprights shall be placed on top of one another with coupling or stacking pins to ensure proper vertical alignment.

Prevention of Separation of Components

4.18.7 Where uplift could occur causing separation of components, frame height adjusting screws, casters, coupling pins and uprights shall be secured to prevent separation of components.

Structural Members

4.18.8 All structural members and other components shall

(1) meet the manufacturer's designed strength specifications,

(2) be maintained in a condition which meets the manufacturer's specifications,

(3) be inspected for defects before use, and any defective parts shall not be used.

Scaffolds on Carrier Vehicles

4.18.9 (1) Scaffolds mounted on carrier vehicles shall be secured to the vehicle to prevent uplift.

(2) Scaffolds shall only be mounted on carrier vehicles which are equipped with levelling jacks or other devices designed to maintain the chassis in a level and stable condition.

Free-Standing Tower and Rolling Scaffolds

Height of Free-standing Tower

4.19.1 The height of any free-standing tower or rolling scaffold shall not exceed three times the minimum base dimension unless the scaffold is securely tied or guyed to prevent overturning.

Use of Outriggers

4.19.2 When outriggers are used to increase the minimum base dimension, they shall be installed on both sides of the scaffold structure.

Caster-type Wheels

4.19.3 At least two of the four wheels on a rolling scaffold shall be of the caster type. Wheels shall not be less than 127 mm diameter.

Caster Height Adjusting Pins

4.19.4 Caster height adjusting pins or screws shall not extend more than ⅔ of their total length, or in excess of 300 mm from their housings.

Locking Devices on Wheels

4.19.5 Wheels shall have effective locking devices and be kept locked when persons are required to work on scaffolds at heights exceeding 1.5 times the minimum base dimension or under conditions that could cause inadvertent movement of the scaffold.

Retention of Planks

4.19.6 Scaffold planks or decking used as work platforms shall have means to keep the planks on the bearers.

Platform Height

4.19.7 (1) Where the platform height exceeds 1.5 times the minimum base dimension, a person on the platform shall not move the scaffold.

(2) Where the platform height exceeds 2 times the minimum base dimension, no person shall remain on the scaffold while it is being moved.

Condition of Floor or Surface

4.19.8 The floor or surface over which a scaffold is moved shall be sufficiently level, and free from pits, holes, depressions or obstructions to ensure stability of the scaffold.

Running Tubular Metal — Frame Scaffolds

Use of Building Ties

4.20.1 Where running tubular metal frame scaffolds are used, building ties shall be installed at vertical intervals, not exceeding 3 times the minimum base dimension, at every third upright as well as at the ends.

Cross-bracing

4.20.2 Internal horizontal cross-bracing shall be installed in a bay immediately adjacent to where building ties are required. Where it is tied to the building and where manufactured planks with retaining hooks are used to provide a fully-decked work platform, the horizontal cross-bracing may be omitted.

Cross-bracing of Scaffold Bays

4.20.3 Each scaffold bay shall be fully cross-braced on both sides in the vertical plane. An individual cross-brace may be removed to allow a specific operation to be performed provided it is replaced immediately after the operation is completed.

Tube and Coupler Scaffolds

Spacing of Uprights

4.21.1 When 38 mm minimum diameter aluminum or steel pipe components are used in tube and coupler scaffolds, the spacing of uprights shall not exceed 3 m and shall be coupled together with horizontal runners and bearers at vertical distances not exceeding 2 m.

Design by a Professional Engineer

4.21.2 Scaffold systems not meeting the requirements of section 4.21.1 shall be constructed in accordance with the design of a professional engineer.

Bearers

4.21.3 Bearers constructed from 38 mm diameter aluminum or steel tubular components shall be limited to 750 mm bearing length.

Single-pole Tube and Coupler Scaffolds

4.21.4 Single-pole tube and coupler scaffolds shall meet the following requirements

(1) the system shall only be used for light duty work,

(2) single-pole bearers shall be secured to the structure with bearer hooks or manufactured brackets of a design acceptable to the chief inspector, the hooks and brackets shall be engaged or secured to sheathing made of plywood not less than 13 mm thick or material of equal strength, and

(3) a minimum of two opposing, horizontal, diagonal braces shall be installed at each bearer level.

Double-pole Scaffolds

4.21.5 Double-pole scaffolds shall have

(1) building ties installed at vertical intervals not exceeding three times the minimum base dimension at every third upright as well as at the ends,

(2) internal horizontal bracing installed in a bay immediately adjacent to where building ties are required (at levels where manufactured planks with retaining hooks are used to provide a fully-decked work platform, the horizontal bracing may be omitted), and

(3) adequate diagonal bracing installed on the outside row of uprights, including the ends, to prevent sway.

Ladder-Jack Scaffolds

Ladder-jack Scaffolds

4.22.1 Ladder-jack scaffolds shall

(1) use only heavy duty ladders meeting the requirements of CSA Standard CAN3-711-M81 "Portable Ladders", and incorporate ladder jacks of types acceptable to the chief inspector,

(2) be limited to light duty work where the work necessitates frequent changes of scaffold position,

(3) not be used at heights in excess of 4.9 m above a grade or floor,

(4) not be used by more than two persons on a single scaffold, and

(5) have the supporting ladders placed in the same plane and secured against movement.

Ladder-jack Work Platforms

4.22.2 Ladder-jack work platforms shall

(1) consist of a single, solid wood plank, meeting the requirements of section 4.15.1, not less than 48 mm×286 mm actual dimensions, and supported at intervals not exceeding 3 m, or

(2) be a manufactured plank at least 305 mm in width and supported at intervals approved by the manufacturer.

Extensions or Continuous Stagings

4.22.3 Ladder-jack work platforms shall not incorporate extensions or continuous stagings.

Thrust-Out Scaffolds

Specifications of a Professional Engineer

4.23.1 Thrust-out scaffolds not conforming with sections 4.23.2 to 4.23.8 inclusive shall be constructed in accordance with the specifications of a professional engineer.

Light Duty Work

4.23.2 Thrust-out scaffolds shall only be used for light duty work.

Wooden Thrust-out Beams

4.23.3 Wooden thrust-out beams shall be at least 89 mm×140 mm actual dimensions (nominal 4″×6″), installed with the larger dimension vertical. Metal thrust-out beams shall be of equivalent strength.

Protrusion of Thrust-out Beams

4.23.4 Thrust-out beams shall not protrude more than 1.1 m beyond their fulcrum points and the distance between beams shall not exceed 2.1 m. The inboard section (extending from the fulcrum point) shall not be less than 1.5 times the length of the outboard section.

Securing of Beams

4.23.5 Beams shall be secured at the inboard ends and fulcrum points by vertical 89 mm×89 mm (4″×4″) wood post shores or equivalent. The height of the post shall not exceed 4.3 m.

Counterweights **4.23.6** Counterweights shall not be used to secure thrust-out beams.

Scaffold Planks **4.23.7** The work platform shall be fully decked with scaffold planks securely fastened to the thrust-out beams.

Not to Be Used as Landing Platforms **4.23.8** Thrust-out scaffolds shall not be used as crane landing platforms, as a support for formwork or for storage of construction materials.

Bracket Scaffolds

Light Duty Work **4.24.1** Wooden bracket scaffolds shall only be used for light duty work.

Brackets **4.24.2** Brackets shall consist of a triangular wood frame, constructed from lumber of not less than 38 mm×89 mm (2″×4″) dimensions or metal of equivalent strength. Wood bracket joints shall have 15 mm plywood gussets on both sides.

Width of the Work Platform **4.24.3** Brackets shall be designed so that the width of the work platform cannot exceed 510 mm.

Bracket Spacing **4.24.4** Bracket spacing shall not exceed 3 m.

Securing of Brackets **4.24.5** Each bracket shall be secured to the structure by means of suitable bolts, form ties, hooks, or welding.

Manufactured Brackets **4.24.6** Manufactured brackets shall be installed and used in accordance with the manufacturer's specifications.

Trestle Scaffolds

Trestle Height **4.25.1** The height of a trestle work platform shall not exceed three times the minimum base dimension of the trestle.

Folding Trestles **4.25.2** When folding trestles are used, means shall be provided to prevent the legs from closing in or spreading.

Extensions **4.25.3** Extensions shall not be added to the trestle legs and tiered trestle scaffolds shall not be used.

Pump Jack Scaffolds

Manufacturer's Instructions

4.26.1 Pump jack scaffold systems shall be installed and used in accordance with the manufacturer's instructions unless specified otherwise in the code.

Light Duty Work

4.26.2 Pump jack scaffolds shall only be used for light duty work.

Wooden Pole Uprights

4.26.3 Wooden pole uprights shall

(1) not exceed 9.1 m in height,

(2) be straight grained lumber #1 Douglas Fir or equivalent, and

(3) consist of two 38 mm×89 mm (2″×4″) lengths of lumber securely spiked together, and have the joints overlap by at least 300 mm.

Mudsills

4.26.4 All poles shall bear on mudsills or other firm foundation.

Securing of Poles

4.26.5 Poles shall be adequately secured to the work wall with triangular bracing or equivalent at the bottom, top and other points to provide braces at vertical intervals not to exceed 3 m.

Suspended Platforms — General

Definitions

"*manually powered suspended platform*" means a suspended platform which is raised and lowered by manually powered hoisting equipment.

"*powered platform*" means powered equipment to provide access to the exterior or interior of a building or structure and includes a suspended platform, a roof car, or other suspension systems, track or guidance systems and the requisite operating and control devices and is permanently attached to a building or structure.

"*portable powered platform*" means powered equipment to provide access to the exterior or interior of a building or structure and includes a working platform, suspension means, and the requisite operating and control devices that are not permanently attached to the building or structure but are removed from their points of suspension after each use and are normally handled on the ground by the operating crew.

"*safe working load*" is the maximum load that the suspended work platform has been designed to handle. This includes the weight of workers, tools, equipment, and materials to be supported. It also includes allowances for loads such as trailing electric power cords and supply lines, or any other loads. It does not include the weight of the work platform and its means of support.

"*suspended loads*" means the weight of the work platform, hangers, stirrups, hoist units, and suspension lines divided by the number of supporting suspension lines plus the full safe working load of the platform.

"*suspension height*" means the distance from the upper attachment points of the suspension lines to the safe lower landing surface for the work platform.

"*ultimate load*" means the load at which collapse of the suspended work platform would occur.

Persons on Suspended Platforms

4.27.1 (1) No person shall board or be on a suspended platform which is 3 m or more above a floor or grade unless he has been secured to an independently anchored lifeline by means of a fall arresting system in accordance with section 4.4.1 of the code. This does not apply where a boatswain's chair is suspended by a block and tackle system, manually operated by a person in the chair.

(2) On a powered platform having four or more suspension ropes, persons shall be secured to solid anchorages on the platform by means of safety harnesses and lanyards.

Suspended Platforms — Chief Inspector's Permission

4.27.2 Suspended platforms shall not be used without the prior permission of the chief inspector when

(1) a suspension system is to support more than one platform,

(2) one suspended platform is used above or below any portion of another suspended platform or there is bridging between suspended platforms,

(3) the work platform exceeds 10 m in length, or

(4) suspension systems other than those covered by the code are proposed for use.

Suspended Platforms of More Than 90 m

4.27.3 When the suspension height exceeds 90 m, boatswain's chairs, manually powered platforms, and portable powered platforms shall not be used without the prior permission of the chief inspector.

Suspended Platforms — Inspection

4.27.4 Suspended platforms shall be inspected by an authorized person before each use and no defective components or improperly rigged equipment shall be used.

Manually Powered Suspended Platforms

Safe Working Load

4.28.1 The safe working load shall be permanently marked on every suspended platform in such a manner as to be clearly readable by persons on the platform. The safe working load shall not be exceeded.

Cornice Hooks

4.28.2 Cornice hooks shall be manufactured from mild steel or other material having similar properties, and shall have a minimum factor of safety of 4, based on the ratio of the ultimate load carrying capacity to the suspended load.

Securing of Cornice Hooks

4.28.3 Cornice hooks shall be secured to structurally sound portions of a building or structure having adequate strength to support the suspended load.

Tie-backs

4.28.4 Cornice hooks and thrust-out beams shall be secured by tie-backs to solid anchorages on the building or structure so as to maintain them in their proper positions. The tie-backs and anchors shall withstand a minimum load of 22 kN (5,000 lbs.).

Safety Factors of Thrust-out Beams

4.28.5 Thrust-out beams shall provide a minimum safety factor of 4 based on the ratio of their ultimate load carrying capacity to the suspended load.

Anchoring of Thrust-out beams

4.28.6 Thrust-out beams shall be anchored or counterbalanced to support 4 times the suspended load. Counterweights shall be permanently marked to indicate their weight and shall be of solid material not subject to loss of weight.

Counterweights

4.28.7 Counterweights shall be effectively secured to the thrust-out beams.

Anchorages

4.28.8 Anchorages used to suspend platforms shall have a safety factor of 4 based on the ratio of the ultimate load carrying capacity to the suspended load.

Suspension Lines

4.28.9 Where suspension lines, tie-backs, lifelines and other parts of the rigging may come into contact with rough or sharp edges, adequate means shall be provided to prevent abrasion or cutting of such lines or parts.

Hooks Used in Rigging

4.28.10 Hooks used in rigging shall have safety latches or be moused.

Block and Tackle Systems

4.28.11 Where a block and tackle system is used for suspending boatswain's chairs

(1) the suspension rope shall have a breaking strength of not less than 20 kN (4,400 lbs.),

(2) at least one double upper block and one single lower block shall be used, and

(3) effective means shall be provided to secure the hauling line.

Wire Rope

4.28.12 (1) Wire rope used to support suspended platforms shall not be less than 8 mm ($\frac{5}{16}$") diameter, made from improved plough steel, and be free of knots, kinks and splices.

(2) The total load on a suspension rope shall not exceed $\frac{1}{10}$th of the breaking strength of the rope.

Length of Suspension Lines

4.28.13 Suspension lines shall be of sufficient length to permit the suspended platform to be lowered to a safe landing. Where it is impractical to lower the platform to a safe lower landing, lower travel limit switches shall be installed.

Hoisting Equipment

4.28.14 Hoisting equipment for suspended platforms shall have automatic mechanisms to prevent slipping or free running of the suspension lines.

Work Platform Hangers

4.28.15 Work platform hangers or stirrups shall be manufactured of mild steel, or other material having similar properties, and shall have a safety factor of not less than 10 based on the ratio of the ultimate load carrying capacity to the suspended load. Wire rope shall not be used. Hangers or stirrups shall be effectively fastened to the work platform.

Chief Inspector's Acceptance

4.28.16 Work platforms shall be at least 500 mm wide, be of a design acceptable to the chief inspector, and have

(1) a safety factor of not less than 4 based on the ratio of the ultimate load carrying capacity to the safe working load established by the manufacturer or certified by a professional engineer,

(2) guarding consisting of a guardrail, intermediate rail and a toe-board meeting the requirements of CSA Standard CAN3-Z271-M84 "Safety Code for Suspended Powered Platforms", or other guarding providing equivalent protection to the satisfaction of the chief inspector.

Portable Powered Platforms

Portable Powered Platforms

4.29.1 Portable powered platforms shall meet all the applicable requirements of sections 4.28.1 to 4.28.16 inclusive, with regard to their design, construction, suspension, and in addition

(1) the power hoisting unit shall be of a type certified by the manufacturer as suitable for the raising or lowering of persons,

(2) means shall be provided to disconnect the electrical power from the hoist unit and the controls shall be of the "deadman" type,

(3) where a platform is actuated by two separately controlled hoists, both controls shall be positioned in such a way that they can be operated simultaneously by one person, and

(4) suitable devices shall be installed to provide upper travel limit protection and to prevent conditions of slack rope.

Powered Platforms

Powered Platforms

4.30.1 Powered platforms shall meet the requirements of CSA Standard CAN3-Z271-M84 "Safety Code for Suspended Powered Platforms" and where circumstances make it impractical to meet these requirements, alternative proposals shall be submitted to, and accepted by the chief inspector prior to installation.

Logbooks

4.30.2 A logbook shall be maintained for each powered platform in which are recorded all inspections, modifications, maintenance, and repair work performed on the unit. All entries shall be dated and signed by the person performing the work.

Operation

4.30.3 Any person involved in the operation of the equipment shall be responsible for recording in the logbook any defect or operating difficulty and shall also report the need for maintenance to his supervisor.

CSA Standard

4.30.4 The logbook shall contain a record of the yearly test and inspection of the equipment as required by CSA Standard CAN3-Z271-M84 "Safety Code for Suspended Powered Platforms".

Boatswain's Chairs

Boatswain's Chair

4.31.1 A boatswain's chair normally shall be suspended from four corners, with the ropes crossed diagonally beneath the seat. Where other forms of suspension slings are used, they shall provide equivalent seat stability.

Support of Boatswain's Chair **4.31.2** When a boatswain's chair is supported by a block and tackle system manually operated by a person in the chair, a body belt shall be worn to secure the person to the seat.

Controlled Descent Devices **4.31.3** Only controlled descent devices acceptable to the chief inspector shall be used in conjunction with boatswain's chairs.

Catenary Scaffolds

Suspension by Catenary Lines **4.32.1** Scaffold systems suspended by catenary lines shall be constructed and installed in accordance with the requirements and specifications of a professional engineer and with the code. A signed copy of the drawings and a certification of the complete installation shall be kept at the mine.

Catenary Ropes Safety Factor **4.32.2** Catenary ropes shall have a factor of safety of not less than 10.

Securing Platform **4.32.3** The platform, directly supported by the catenary ropes, shall be secured to prevent dislodgement from the ropes and to prevent the staging from falling if a catenary rope should fail.

Safety Harness Attachment **4.32.4** Unless safety nets have been installed, persons on a catenary scaffold shall wear safety harnesses attached to independently anchored lifelines attached to the building or structure.

Needle Beam Scaffolds

Needle Beam Scaffolds **4.33.1** Needle beam scaffolds shall be constructed in accordance with the specifications of a professional engineer and with the requirements of the code. The scaffold shall have a safety factor of 5 for the platform components and a safety factor of 10 for the suspension components.

Supporting Ropes **4.33.2** Supporting ropes shall be fibre ropes having a breaking strength of not less than 24 kN (5,400 lbs.), or other material of equal strength, and be rigged to provide a minimum three-part suspension for each support.

Supporting Beams

4.33.3 Supporting beams shall not measure less than 89 mm×140 mm (4″×6″) of #2 grade and better lumber of Hem-Fir, or equivalent, for spans not exceeding 1.8 m for light duty work or 1.2 m for heavy duty work. The beams shall be rigged with their greater dimension vertical.

Needle Beam Securing

4.33.4 Needle beam platform components shall be secured to prevent relative movement, rotation, and dislodgement.

Safety Harness Use

4.33.5 Persons on needle beam scaffolds shall wear safety harnesses attached to independently anchored lifelines attached to the building or structure.

Outrigger Scaffolds

Outrigger Scaffolds

4.34.1 Outrigger scaffolds shall be constructed and installed in accordance with the specifications of a professional engineer and with the requirements of the code. A signed copy of the drawings and a certificate of the complete installation shall be kept at the mine.

Support Design

4.34.2 The work platform shall be designed to support four times the intended live and dead loads or 3.6 kPa (75 lb./sq. ft.),whichever is greater, and so that a failure of a single suspension will not result in the collapse of the platform.

Suspension Lines Factor of Safety

4.34.3 The suspension lines shall be designed to provide a safety factor of not less than 10.

Outrigger Beams

4.34.4 The outrigger beams shall be secured to sound portions of the structure. Counterweights shall not be used.

Outrigger Beams Support

4.34.5 Each outrigger beam shall support a platform bearer with an inner and outer suspension line. Each of these lines shall be securely fastened to an end of a bearer.

Securing to Bearers

4.34.6 Scaffold planking and decking shall be secured to the bearers.

Guardrails

4.34.7 Guardrails meeting the requirements of section 4.14.5 shall be installed.

Hoisting Mechanism

4.34.8 Hoisting mechanisms shall have devices to prevent inadvertent movement.

Securing of Platform

4.34.9 The platform shall be secured to the building or structure except when it is being raised or lowered.

Overhead Hazards

4.34.10 Protection from overhead hazards shall be provided when required.

Safety Harnesses

4.34.11 The use of safety harnesses and lifelines is not required on outrigger scaffolds.

Work Platforms Suspended From Hoists

Persons Not Allowed to Ride

4.35.1 No person shall ride on loads, slings, hooks, work platforms, or other similar equipment, unless specifically authorized by the manager, and the authorization shall not be granted for reasons of expediency or personal convenience, but only where it is necessary to the work process, and only when the provision of the normal means of access or conveyance is impracticable.

Requirements

4.35.2 Unless provided elsewhere in the code, work platforms suspended from hoisting equipment shall

(1) be designed by a professional engineer and copies of the design and fabrication drawings shall be kept at the mine,

(2) be equipped with standard guardrails on all open sides in accordance with section 4.15.5 and 4.15.6 or be enclosed to give equivalent protection,

(3) be clearly marked with an identification number, the weight of the platform and rigging and the safe working load of the platform,

(4) have supporting hooks and shackles latched or moused to prevent dislodgement, and

(5) not use spreader bars between the load hook and the platform.

Requirements

4.35.3 Work platforms suspended from hoisting equipment shall

(1) be such that the weight of the platform and rigging plus the safe working load of the platform shall not exceed ¼ of the safe working load of the hoisting equipment,

(2) have all suspension slings and attachments rigged to provide a safety factor of not less than 10. The platform shall be designed with a safety factor of 4,

(3) be suspended from cranes having power booms or fixed booms and from hoisting gear capable of lowering under power, and hoisting and lowering speeds shall be kept as low as practicable and lowering of persons shall only be performed under power,

(4) have power hoists and winches of a type approved for such purpose by the manufacturer,

(5) have dogs in the hoisting equipment drive mechanism secured against inadvertent disengagement,

(6) have a designated person on the platform direct all movement of the platform, and

(7) have persons on the platform wear safety harnesses with lanyards secured to a substantial anchorage on the platform.

Crane or Hoist Operations

4.35.4 A crane or hoist shall be operated by a qualified and authorized person whenever a person is on a suspended platform and the operator shall remain at the controls while the platform is suspended.

Boom Cranes

4.35.5 (1) Telescoping-boom cranes used to suspend a work platform shall incorporate an "Anti-Two Block" device referenced in CSA Standard Z150-1974 "Safety Code for Mobile Cranes".

(2) When required by the mechanical inspector, non-telescoping boom cranes used with suspended work platforms shall be equipped with an anti-two block warning device which alerts the crane operator before a two block situation occurs. The warning shall be activated when the load hook from which the platform is suspended is within 2 m of the boom sheave.

Inspection **4.35.6** Every suspended work platform shall be regularly inspected by an authorized person, as often as necessary to ensure that it can safely handle its rated load, and if any defect or doubtful condition is noted, the platform shall not be used until

(1) repairs or corrective action has been taken, and

(2) the load carrying components have been non-destructively tested and the platform re-inspected.

Load Carrying Components **4.35.7** Load carrying components of suspended work platforms shall be non-destructively tested before being put into service and at subsequent intervals not exceeding 12 months.

Logbooks **4.35.8** A logbook shall be maintained for suspended work platforms in which all tests, inspections, maintenance work and repairs shall be recorded. All entries shall be dated and signed by the person responsible for the work.

Construction and Excavation — General

Erection or Dismantling of Equipment **4.36.1** (1) In the erection or dismantling of equipment or structures of skeleton construction, safe working areas shall be provided as the work progresses.

(2) A temporary floor, decking, or formwork shall be installed at the main working level from which work is carried on. Where this is not practicable, a temporary floor or other equally effective arrangement shall be installed not more than two levels or 8 m below the working level.

(3) Temporary floors, decking, or concrete formwork shall cover the work area, except for openings necessary for the movement of persons and materials.

(4) Temporary floors and decking, floor opening covers, and similar load bearing surfaces shall be designed to support a minimum uniformly distributed load of 2 kPa (42 lb./sq. ft.).

Floor and Roof Openings **4.36.2** Floor and roof openings which are a danger to persons shall

(1) be securely covered with a cover that is clearly marked as

such, or

(2) have a standard guardrail enclosing the exposed sides, or

(3) have personnel and material safety nets installed below the opening.

Falling Material

4.36.3 Where there is a danger of material falling into work areas

(1) such areas shall be fenced off against the inadvertent access of persons, and warning signs shall be prominently displayed on all sides and approaches, or

(2) protective canopies shall be installed, or

(3) catch platforms shall be provided which shall

(a) be installed not more than 7.6 m below the level from which material could fall and extend outward from the structure for at least 2.4 m, and

(b) slope inward toward the structure and have baffles to prevent material falling from the catch platform (baffles are not required when material netting is used as a catch platform).

Chutes for the Removal of Material

4.36.4 Chutes shall be provided for the removal of material or debris where the free fall exceeds 6 m. Vertical chutes shall be completely enclosed and fitted with gates at each entrance. Discharge areas shall be fenced off and posted with warning signs to prevent injury to persons by falling debris.

Working Over Water

4.36.5 When working over water where there is a danger of drowning

(1) each person shall be provided with, and wear, a personal flotation device which meets the requirements of section 3.3.3 (2), and

(2) the manager shall provide a powered rescue boat of sufficient size, capable of being operated under all prevailing circumstances and stationed downstream of the work area complete with

(a) an authorized operator who shall be in charge of the boat and one other person to assist him,

(b) personal flotation devices for each person in the boat,

(c) a lifebuoy which is equipped with a line not less than 15 m in length and having a strength not less than that of a 10 mm (⅜″) manila rope, and

(3) where boats cannot be used effectively, personnel safety nets shall be installed or other effective means of rescue provided.

Sloped Ramps

4.36.6 When sloped ramps, runways, and walkways are used, the upper surfaces shall have cleats at not more than 400 mm intervals unless other effective non-skid measures are used.

Limitations of Walkway Use

4.36.7 No person shall use as a walkway the upper surface of any structural unit having shear connectors, dowels or other protrusions.

Evacuation of Persons — Building Exceeding 18 m

4.36.8 (1) Where a building or structure under construction exceeds 18 m in height, an injured person shall be evacuated from any working level by

(a) a personnel hoist, acceptable to the district inspector, or

(b) an emergency skip of a design and construction acceptable to the chief inspector, and a suitable crane; the skip shall not be used for any other purpose.

(2) The personnel hoist and emergency skip shall

(a) be capable of safely transporting the injured person on a stretcher and an attendant, and

(b) be readily accessible to an ambulance or other emergency transport vehicle.

(3) The emergency evacuation system shall be maintained until a permanent elevator is in service.

Glass Panels

4.36.9 Glass panels which could be a danger to persons shall be marked at the time of installation to clearly indicate their presence, or be guarded by barriers, or other effective means, if marking could damage the glass.

Designated Platform Used to Receive Loads

4.36.10 A designated platform used to receive loads transported by a crane shall be designed and certified by a professional engineer and the drawings and certification shall be kept at the mine.

Crane Landing Platforms

4.36.11 Crane landing platforms shall

(1) have the safe working load clearly marked on the platform, and visible to all persons involved, and the safe working load shall not be exceeded,

(2) when located 3 m or more above grade, have standard guardrails on exposed sides, and

(3) where the installation of guardrails is not practicable, each worker on the crane landing platform shall wear a fall arresting device attached to a lifeline secured to a firm anchorage above the platform in accordance with section 4.4.1.

Masonry Walls

4.36.12 Masonry walls erected to a height of 3 m or more above grade or floor level shall be stabilized to withstand a wind pressure of at least 478.8 Pa (10 lbs./sq. ft.).

Tilt-Up and Pre-Cast Building Construction

Requirements by Manager

4.37.1 The manager shall ensure

(1) that tilt-up construction is planned and carried out in accordance with good engineering practice and under the direct control of a professional engineer, and

(2) that erection and bracing drawings and supplementary instructions, signed and certified by a professional engineer, are available at the mine during the construction period.

Tilt-up Project Commencement

4.37.2 Before commencing a tilt-up project, the manager shall ensure that a set of panel layout plans, showing the lifting sequences, is immediately available.

Concrete Formwork and Falsework

Definitions

"falsework" means the structural supports and bracing required for the support of temporary loads during construction.

"form" means the mould into which concrete is placed.

"formwork" includes form, falsework and foundation.

"foundation" means the solid ground or base (natural or built up) on which the falsework is supported, and includes all underlying ground strata.

Instructions of a Professional Engineer

4.38.1 (1) Concrete formwork, falsework, and reshoring shall be designed, constructed, erected, used, maintained, and dismantled in accordance with the instructions of a professional engineer. Concrete formwork and falsework design and practice shall meet the requirements of CSA Standard S269.1-1975 "Falsework for Construction Purposes" and any applicable Reference Standards in Table 1 of that Standard.

(2) Notwithstanding subsection (1), the manager may authorize a qualified person, other than a professional engineer, to design formwork, falsework, and reshoring where he is satisfied that the work, because of its size and nature, can be safely carried out.

Erection Drawings

4.38.2 Erection drawings and any supplementary instructions for concrete formwork, falsework, and reshoring shall be signed and certified by a professional engineer and shall be available at the mine during the construction period, for the following types of formwork

— fly forms

— gang forms

— slip forms

— suspended slab forms

— beam forms
— jump forms
— wall and column forms (over 3.6 m high)
— single-sided forms (over 1.8 m high)
— cantilever forms
— bridge deck forms
— shaft lining forms
— tunnel lining forms

Erection Drawings Information

4.38.3 Erection drawings and any supplementary instructions, shall clearly show all information necessary to enable the concrete formwork, falsework, and reshoring to be accurately and safely assembled to meet the design requirements. These documents shall contain the following information

(1) erection drawings showing sufficient plan and sectional views, and connection details, enlarged where necessary, to clearly describe the formwork and allow its accurate assembly,

(2) the quality and grade of materials to be used for the various components and connections,

(3) an accurate description of proprietary items, including fittings, to permit accurate field identification,

(4) the load bearing capacity required of the material upon which sills are to be placed and, where applicable, details of procedures to be followed to develop the required capacity,

(5) the sequence, method and rate of load placement to prevent overloading of any part of the formwork,

(6) construction, erection and dismantling procedures that require special attention including, where applicable, the handling of multi-use formwork panels,

(7) details of necessary supports, specifying the materials, dimensions and locations of the external braces, ties, and other support devices, required to maintain lateral stability and resist side sway and racking,

(8) the minimum dimensions and materials of sills or other foundation members,

(9) where structural components connect together, details of the connections to prevent accidental displacement or rotation of the components,

(10) the reshoring plan where applicable,

(11) the details of the form or mould into which the concrete is placed, and

(12) sufficient information regarding loads and deflections to permit the design of the concrete formwork and falsework to be understood by any professional engineer other than the original designer, if necessary.

Field Designs

4.38.4 All field designs, deviations from the erection drawings, and supplementary instructions shall be authorized in writing by a professional engineer.

Continuity of Design

4.38.5 The manager shall ensure continuity of design, construction and inspection in the event of a change of professional engineers or where the separate work of two or more engineers is involved.

Fly Form System Drawings

4.38.6 Fly form system drawings and instructions shall meet the following additional requirements

(1) erection drawings shall be detailed to show a plan view, a longitudinal section, a cross section of each type of panel, and the calculated position of the centre of gravity of the panels,

(2) the design shall provide that when a panel is landed on a supporting surface, and before anyone climbs or walks on it and before any reinforcing steel or concrete is placed on it, the panel shall

(a) resist a minimum horizontal load of 3.6 kN (800 lbs.), applied in any direction on the top edge,

(b) have a safety factor of at least 1.6 against overturning when the dead load plus the most severe live load plus horizontal loads are considered, and

(c) have a safety factor of at least 2 against overturning when the dead load plus the most severe live load, or the dead load plus horizontal loads are considered,

(3) fly form legs shall be placed to attain the required safety factor against overturning about any possible axis,

(4) the safety factor against sliding of the panel along the supporting surface shall be at least 1.5,

(5) if any of the safety factors required in subsection (2), (3) and (4) cannot be attained, the panel shall be secured with properly designed devices which are attached to the permanent structure or to an adjacent panel so that the required safety factor is attained, and the attachment shall be completed before the panel is detached from the crane or hoist,

(6) when all panels have been assembled to form one continuous piece of concrete formwork, the formwork and falsework shall have the safety factors required by section 4.38.1,

(7) the erection drawings and any supplementary instructions shall show the step-by-step procedure for each stage of the operating cycle including assembly, flying, use, dismantling, and re-use of a panel, and any special procedure for a non-typical floor,

(8) if any panel is not inherently stable for all possible conditions of load, special attention shall be given to the procedure for ensuring stability, and

(9) the erection drawings, special instructions and procedures required in subsection (4) shall be made available to persons involved in any part of the operating cycle.

Inspection and Certification Prior to Concrete Pour

4.38.7 (1) Immediately prior to each concrete pour, the formwork and falsework shall be inspected and a professional engineer shall sign and certify a written statement which shall

(a) indicate the specific areas inspected,

(b) certify that the formwork and falsework are in accordance with the latest approved erection drawings and any supplementary information, and

(c) certify that any specified reshoring is in place.

(2) The certified statement shall be kept at the mine and be made available to an inspector on request.

Gang Forms

4.38.8 Notwithstanding section 4.38.7, where gang forms are used repeatedly on a specific project, pre-pour inspections, after the initial pour, may be made by a person authorized by the manager without issuing a written certificate, provided that no structural or procedural alterations have been made.

Persons Underneath Formwork During Pouring

4.38.9 Persons who are required to be underneath the formwork during the pouring of concrete or placing a load, shall be restricted to safe areas.

Placing of Concrete to Be Stopped

4.38.10 Placing of concrete or other loads shall be stopped if any weakness, undue settlement, or excess distortion of the formwork is noted and shall not be restarted until after the formwork has been strengthened or repaired in accordance with the instructions of a professional engineer.

Protruding Ends of Reinforcing Rods

4.38.11 The protruding ends of reinforcing rods shall be guarded if they could endanger persons.

Collapse of Formwork or Falsework

4.38.12 Any collapse of formwork or falsework shall be regarded as a dangerous occurrence under section 1.7.3 (11) of the code and the manager shall ensure that the procedure required by sections 1.7.1 and 1.7.2 of the code is followed.

Concrete Pre-Tensioning and Post-Tensioning

Protection of Components

4.39.1 (1) Tendons, including bars, strands and wires, used for tensioning purposes shall be protected during handling, transportation, and storage against physical damage, exposure to electric arcs, and excessive rusting.

(2) Strand extenders shall not be re-used until inspected and certified by an authorized person or a professional engineer.

Welding, Burning

4.39.2 No welding, burning or similar work shall be done on any bed where strands have been strung or tensioned unless proper care has been taken to protect the strands from sparks, stray electrical currents, or other sources of heat.

Visual Signalling Devices

4.39.3 (1) Visual signalling devices at the dead ends of tensioning operations, and audible signalling devices at the tensioning ends, shall be used to warn persons approaching the area that tensioning is taking place.

(2) Persons not directly involved in tensioning operations shall keep clear of the area, and remain clear, until the operations have been completed and the warning signals turned off.

(3) Where the tensioning crew cannot clearly observe the dead end during the entire tensioning period, a person shall be posted in a safe location to ensure that no one enters the danger area.

Tensioning Operations

4.39.4 During all tensioning operations no person shall be permitted on the bed or, if open-sided forms are used, on immediately adjacent beds.

Persons to Be Protected

4.39.5 (1) Persons shall be protected by guards or other suitable devices at the tensioning ends and anchoring points, which contain the flying strands and the strand vises, in case of strand failure.

(2) Guards shall be fabricated from mild steel plate, not less than 6 mm (¼″) thick, or from steel mesh, which affords equivalent protection, provided that no opening shall be larger than 25 mm×25 mm (1″×1″).

Deflection of Strands

4.39.6 When strands are being deflected, no persons shall be permitted on the bed.

Deflecting Devices

4.39.7 Deflecting devices shall be designed to prevent slip-out and to allow strands to be backed off from the deflected position.

Equipment Malfunction

4.39.8 Corrective action required due to equipment malfunction or strand damage shall be carried out under the direction of a professional engineer or an authorized person.

Detensioning Operations

4.39.9 During detensioning operations, either by jacks or burning, an area on each side of the strands, equal to the exposed length, shall be kept clear of all persons. Where the exposed length is contained in a form with solid sides, no person shall be located on the bed itself, or in the area on each side of the strands equal to the exposed length not protected by such forms.

Strand Elongation

4.39.10 Strand elongation and strand deflection shall be measured by a means which does not endanger any person.

Light Frame and Wood Truss Erection

Requirements of Manager

4.40.1 The manager shall ensure that open-web joists and trusses are handled, positioned and braced in accordance with the instructions of the truss manufacturer or a professional engineer, and that the instructions are available at the workplace during the construction period.

Excavations

Instructions of a Professional Engineer

4.41.1 All excavation work shall be carried out in accordance with the written instructions of a professional engineer where

(1) the excavation is more than 6 m deep,

(2) timber shoring is used in excavations exceeding 3.7 m in width, or

(3) improvements or structures adjacent to the excavation could endanger persons, or

(4) the excavation is subjected to vibration or hydrostatic pressure.

Certification by a Professional Engineer

4.41.2 The written instructions required by section 4.41.1 shall be signed and certified by the professional engineer and be available at the workplace. They shall describe the supporting or sloping requirements and indicate the sub-surface conditions likely to be encountered.

Manager's Requirement

4.41.3 The manager shall ensure that no person enters any excavation over 1.2 m in depth unless

(1) the sides of the excavation are sloped to a safe angle not exceeding 3 horizontal to 4 vertical, or

(2) the sides have been supported in accordance with the minimum requirements specified in Tables 1 and 2 of this Part, or

(3) the sides have been sloped or supported in accordance with the written instructions of a professional engineer.

Combination of Sloping and Shoring

4.41.4 When a combination of sloping and shoring is used, the protection provided to persons shall be equivalent to that meeting the minimum code requirements for the overall depth of the excavation.

Use of Lumber for Shoring and Timbering

4.41.5 Lumber used for shoring and timbering shall be #2 grade and better, and species to be limited to the following groups: Douglas Fir -Larch, Hem-Fir, Spruce-Pine-Fir or Coast Sitka Spruce. All lumber shall be graded to the National Lumber Grades Authority Rules or other grading rules approved by the chief inspector.

Shoring Contact With Faces of Excavation

4.41.6 Shoring or manufactured or prefabricated support systems shall be installed in firm contact with the faces of the excavation. Any voids shall be backfilled or blocked.

Hydraulic or Pneumatic Jacks

4.41.7 Hydraulic or pneumatic jacks shall have devices which maintain the jacks at their installed length in the event of a loss of internal pressure.

Steel Trench Jacks

4.41.8 Steel trench jacks, with minimum equivalent sizes as shown below, may be substituted for timber struts:

Nominal Strut Size inches (mm)		Nominal Pipe Diameter inches (mm)
4×4	(89×89)	1.5 Standard (38)
4×6, 6×6	(89×140, 140×140)	2.0 Standard (50)
6×8, 8×8	(140×184, 184×184)	3.0 Standard (76)

Use of Plywood

4.41.9 Plywood may be substituted for 50 mm (2″) shoring elements provided that

(1) the plywood is not less than 19 mm (¾″) in thickness,

(2) the trench is not over 2.7 m in depth,

(3) uprights are installed at no more than 600 mm centre to centre, and

(4) struts do not bear directly on to plywood.

Ladder to Be Kept

4.41.10 A ladder shall be kept in the immediate area of persons working in any excavation over 1.2 m deep.

Requirements Prior to Starting Excavation or Drilling

4.41.11 Prior to starting excavating or drilling, the location of underground utility services in the area shall be accurately determined to ensure persons are not endangered.

Pointed Tools

4.41.12 Pointed tools shall not be used to probe for underground gas and electrical services.

Surrounding Equipment and Objects

4.41.13 Trees, utility poles, rocks and similar objects near an area to be excavated, shall be removed or secured before excavation is commenced.

Excavated Material

4.41.14 Excavated material shall be kept back a minimum distance of 600 mm from the edge of any trench excavation less than 3.6 m wide. In any other excavation, the minimum distance shall be 1.2 m.

Danger of Persons Falling into Excavation

4.41.15 Where there is a danger of persons falling into an excavation, it shall be covered, or standard guardrails or barriers shall be placed along the exposed sides.

EXCAVATIONS OVER 1.2 M IN DEPTH
TABLE 41.1
SIZE AND SPACING OF MEMBERS (IMPERIAL UNITS)

UPRIGHTS			WALES		STRUTS			
					Width of Trench (feet)		Maximum Spacing	
Trench Depth (feet)	Minimum Dimension (inches)	Maximum Spacing (feet)	Minimum Dimension (inches)	Maximum Vertical Spacing (feet)	Up to 6 Minimum (inches)	6 to 12 Dimensions (inches)	Vertical (feet)	Horizontal (feet)
Hard and Solid Soils								
4–10	2×10	6	4×6	4	4×4	6×6	4	6
10–15	2×10	3	6×6	4	4×6	6×8	4	6
Soils Likely to Crack or Crumble								
4–10	2×10	3	4×6	4	4×6	6×6	4	6
10–15	2×10	3	6×8	4	6×6	6×8	4	6
Soft, Sandy, Filled or Loose Soils								
4–10	2×10	Close tight	6×8	4	6×6	6×8	4	6
10–15	2×10	Close tight	8×8	4	6×8	8×8	4	6

NOTES:

(1) Wales may be omitted in trenches not exceeding 8 feet (2.44 m) in depth provided the soil is sufficiently hard and solid to safely permit wale deletion and the trench is not in proximity to previously excavated ground.

(2) At least 2 struts shall be installed in each vertical plane where struts are required.

EXCAVATIONS OVER 1.2 M IN DEPTH
TABLE 41.2
SIZE AND SPACING OF MEMBERS (S.I. [METRIC] UNITS)

UPRIGHTS			WALES		STRUTS			
				Maximum	Width of Trench (feet)		Maximum Spacing	
Trench Depth (m)	Minimum Dimension (mm)	Maximum Spacing (m)	Minimum Dimension (mm)	Vertical Spacing (m)	Up to 1.8 Minimum (mm)	1.8–3.7 Dimensions (mm)	Vertical (m)	Horizontal (m)
Hard and Solid Soils								
1.2-3	38×235	1.8	89×140	1.2	89×89	140×140	1.2	1.8
3-4.6	38×235	0.9	140×140	1.2	89×140	140×191	1.2	1.8
Soils Likely to Crack or Crumble								
1.2-3	38×235	0.9	89×140	1.2	89×140	140×140	1.2	1.8
3-4.6	38×235	0.9	140×191	1.2	140×140	140×140	1.2	1.8
Soft, Sandy, Filled or Loose Soils								
1.2-3	89×235	Close tight	140×191	1.2	140×140	140×191	1.2	1.8
3-4.6	89×235	Close tight	191×191	1.2	140×140	140×191	1.2	1.8

Notes on Table 41.1 apply to Table 41.2.

Miscellaneous Hoisting Equipment

Miscellaneous Hoising Equipment Requirements

4.42.1 Except as otherwise specified in the code, all cranes, derricks and similar hoisting equipment, shall be designed, constructed, erected, disassembled, maintained, and operated in accordance with the requirements of the manufacturer's specifications and instructions, and the following applicable standards, as amended from time to time

(1) Crane Manufacturers' Association of America, Inc. "Specifications for Electric Overhead Travelling Cranes", CMAA Specification #70, 1988,

(2) ANSI B-30.2-1983, "Overhead and Gantry Cranes",

(3) ANSI B 30.11-1980, "Monorail Systems and Underhung Cranes",

(4) CSA Standard Z248-1975 "Code for Tower Cranes",

(5) CSA Standard Z150-1974 "Safety Code for Mobile Cranes",

(6) ANSI B30.7, 1984, "Base Mounted Drum Hoists",

(7) ANSI B30.16,-1981, "Overhead Hoists",

(8) ANSI B30.6,-1984, "Derricks",

(9) ANSI B153.1- 1981, "Safety Requirements for the Construction, Care and Use of Automotive Hoists", and

(10) CSA Standard CAN/CSA-Z256-M87, "Safety Code for Material Hoists".

Safe Working Load

4.42.2 Where the origin or the safe working load of a crane, derrick, or similar hoisting equipment cannot be ascertained, or its continued safe use cannot be assured, the equipment shall be re-certified by a professional engineer.

Professional Engineer's Certification

4.42.3 Any modification, manufacture, or repair of a structural element or component of a crane, derrick, or hoist shall be approved by the original manufacturer, or carried out under the direction of a professional engineer who shall certify the work performed.

Manufacturer's Manual

4.42.4 The manufacturer's manual for cranes, derricks, and similar hoisting equipment shall be available at the place where the equipment is used. The manual shall show, in English, the approved methods of erection, dismantling, operation, adjustment, and maintenance of the component parts and the assembled equipment.

Maintenance History

4.42.5 The manager shall maintain, or obtain a copy of, a file or record of the maintenance history of the following powered hoisting equipment used at the minesite

(1) overhead travelling bridge and gantry cranes,

(2) tower cranes,

(3) stiff leg, guy, A-frame and gin-pole derricks,

(4) material hoists, and

(5) mobile cranes, draglines, and other hoisting equipment of more than 1 800 kg (4,000 lbs.) capacity.

Logbook

4.42.6 (1) A logbook shall be provided and maintained for each unit of equipment listed in section 4.42.5. All inspections, modifications, maintenance and repair work shall be recorded in the logbook, and dated and signed by the person who did the work.

(2) Any person involved in the operation of the hoisting equipment shall be responsible for recording in the logbook, any defect or operating difficulty that he notices, and reporting the matter to his supervisor.

(3) The supervisor shall examine, date and sign the logbook, at least weekly, to ensure the required entries have been made.

Name, Model and Serial Number

4.42.7 (1) The name, model, and serial number assigned by the manufacturer shall be clearly visible and legible on every crane, hoist, and derrick.

(2) Structural components which are interchangeable between units, or which can be assembled in different configurations, shall be permanently marked with a clearly visible and legible unique number to ensure their correct identification for correlating with maintenance and certification records.

Permanent Sign

4.42.8 (1) A permanent, clearly visible, and legible sign shall be affixed to each crane, derrick, and hoist showing the safe working load.

(2) The safe working load shall be marked on the load block and superstructure of hoisting equipment and shall be maintained in a legible condition.

(3) The safe working load shall not exceed the safe working capacity of any component in the hoisting system, including the supporting structure.

(4) Subsections (1) and (2) do not apply when the safe working load is affected by

(a) the length of a boom or jib, or its vertical or horizontal angle, or

(b) the position of a load-supporting trolley, or

(c) the use or position of outriggers to increase the stability of the unit.

(5) Where the safe working load is affected by the factors listed in subsection (4), a separate load chart showing the safe working loads in all possible working positions and configurations shall be permanently posted on the equipment or issued to the operator of the equipment. The operator shall keep the load chart in a legible condition and have it available at all times when operating the equipment.

Angle of Boom and Radius Lift

4.42.9 (1) Every crane, derrick, and similar hoisting equipment with a boom that can be moved in a vertical plane shall be provided with a device to indicate the angle of the boom or the radius of the lift.

(2) Telescoping booms shall be suitably marked to indicate the amount of boom extension or be provided with boom extension indicators.

(3) Devices installed in accordance with subsections (1) and (2) shall be clearly visible from the operator's location.

Interruption of Main Circuit

4.42.10 Where electric cranes are operated from cabs, the operator shall be able to safely interrupt the main circuit under any load condition.

Controls

4.42.11 (1) Each control for a crane, derrick, or hoist shall be clearly marked to show its function.

(2) All bridge, gantry, and overhead travelling cranes operated by pendant or radio controls shall have signs on the crane structure, visible to an operator, clearly indicating the direction of hook, bridge, and trolley motions, compatible with those marked on the controls.

Hoisting Controls Not Operated From a Cab

4.42.12 Where hoisting controls are not operated from a cab, they shall be so located that they can be operated at a safe distance from the load being handled.

Radio Control Systems

4.42.13 Radio control systems shall meet the following requirements

(1) they shall be designed to prevent movement of hoisting equipment except in response to actuation of the control devices, and only when all safety circuits are closed,

(2) provisions shall be made to maintain a signal-to-noise ratio of 10 to 1,

(3) multiple signals shall be generated by a minimum of two channels or by a coded single channel,

(4) where a code is used, two parts of the code shall be required for safety, neither of which can be easily generated from ambient signals, and a further information bit shall also be required to distinguish each signal,

(5) where two or more units may be operated in contact with each other, a further code signal shall be required to identify each unit and prevent response by other than the instructed unit,

(6) the system manufacturer shall certify that the radio controlled system meets the above requirements.

Protection of Hoisting Equipment Operators

4.42.14 (1) Hoisting equipment operators shall be protected against heat, cold, flying, or falling objects or other adverse or dangerous conditions that could endanger them.

(2) Operator cabs shall afford protection from the weather and from overhead hazards. Windows shall be of safety glass or other material providing equivalent protection.

(3) A fire extinguisher, having a ULC rating of at least 5BC shall be immediately available to the operator of each cab-equipped crane.

Miscellaneous Hoisting Equipment — Operation

Manager's Requirements

4.43.1 The manager shall ensure that the operator of any hoisting equipment

(1) is qualified and only authorized by an authorized person, and

(2) knows the signals in Figures 1 and 2 of this Part.

Operator's Inspection

4.43.2 The operator shall inspect the hoisting equipment at the beginning of his shift and test the limit switches, brakes, circuit breakers, and other control and safety devices. If any defects or problems are noted, the operator shall notify his supervisor and the equipment shall not be operated until the defects or problems have been corrected and authorization received from the supervisor.

Audible Warning Signal

4.43.3 An effective audible warning signal shall be provided on any hoisting equipment and operators shall ensure the signals are used as required.

Boom Stops

4.43.4 Where the design of a crane, derrick, or similar hoisting equipment is such that the boom could fall over backwards, positive boom stops shall be installed. In addition, a device shall be provided to automatically stop the hoisting of a boom when it reaches a predetermined angle.

Manager's Requirements

4.43.5 (1) The manager shall ensure that the weight of the load is determined and communicated to the operator and to any other persons involved in the lifting operation. The weight shall be given in the same units as shown on the load chart.

(2) The operator shall not attempt to hoist any load if he has any doubt that it can be safely handled, but he shall inform his supervisor who will determine what action is required.

Operator's Responsibilities

4.43.6 The operator of hoisting equipment shall ensure that

(1) a load being handled does not contact the boom and that the boom does not contact any structure or equipment,

(2) the load block is suspended directly over any load being handled.

Loads to Be Safely Landed

4.43.7 Loads shall be safely landed, supported, and stabilized before being unhooked.

Travelling With a Suspended Load

4.43.8 (1) When a crane is travelling with a suspended load, the operator shall ensure that the load is carried as close to the ground as possible and rigged, as necessary, to control swinging of the load.

(2) When necessary, a person designated as a signaller shall walk ahead of the moving load to warn persons to keep clear.

Operator's Sustained Control

4.43.9 The operator shall not leave the controls of any hoisting equipment while a load is suspended.

Authorized Person

4.43.10 (1) All loads shall be slung or hooked by an authorized person.

(2) Whenever the operator does not have an unobstructed view of the load hook and load throughout the whole range of the hoisting operation, he shall act only on the directions of an authorized signaller who shall use the signals shown in Figures 1 and 2 of this Part.

(3) Two-way radio or other communication systems acceptable to the chief inspector shall be used when weather conditions or distance render the use of hand signals impracticable or unsafe.

Contact With an Energized Electrical Conductor

4.43.11 Hoisting equipment which has been in contact with an energized electrical conductor or struck by lightning shall be removed from service and not returned until safe use has been assured by a professional engineer.

Distance From High Voltage Conductors

4.43.12 No work shall be performed nor shall machinery, equipment, tools, or materials be used or stored within the following specified minimum distances from any high voltage electrical conductor or equipment capable of energizing the material or equipment.

Voltage (phase to phase)	**Min. Distance**
751 v to 75 kv	3 m (10 ft)
Over 75 kv to 250 kv	4.6 m (15 ft)
Over 250 kv to 550 kv	6 m (20 ft)

Lifts Near Energized High Voltage Conductors

4.43.13 When lifts are performed over energized high voltage conductors, the minimum clearances specified in 4.44.12 shall be followed, and they shall be supervised by an authorized person.

Two or More Cranes Used on a Lift

4.43.14 Where the use of two or more cranes, derricks and similar hoisting equipment is required in a lifting operation,

(1) the operation shall be under the direct supervision of an authorized person, be fully planned in advance and the plans communicated to all persons involved in the operation, and

(2) effective communications shall be established and maintained between all persons involved, during the complete lifting operation.

Loads Not to Be Passed Over Persons

4.43.15 Loads shall not be passed over persons unless there is no practicable alternative, and then only after the persons have been warned of the danger.

Tower Cranes

Automatic Safety and Control Devices

4.44.1 Automatic safety and control devices, including trolley travel limits, load limits, hoist limits, and rail travel limits, shall only be installed and adjusted by authorized persons.

Load Limit Devices

4.44.2 (1) Load limit devices shall be tested at the beginning of each shift in accordance with the manufacturer's testing requirements. Other automatic safety and control devices shall be tested once each shift. Results of all tests shall be entered in the equipment logbook.

(2) The required test blocks shall be available at the workplace. The weights shall be accurately determined and durably and legibly marked on the blocks.

Malfunctions of Load Limit Devices

4.44.3 Any malfunction of a load limit device shall be reported to the supervisor and the crane shall not be used until the necessary corrective action has been taken.

Access on the Mast of a Tower Crane

4.44.4 (1) Access ladders shall be provided on the mast of a tower crane.

(2) A landing platform shall be provided at least every 9 m within the length of climb.

(3) Each section shall be offset horizontally from adjacent sections, or the landing platforms shall be equipped with trap doors.

(4) A ladder cage shall be provided where a single length of climb exceeds 7 m.

(5) Cages shall provide protection equivalent to that of a 675–750 mm, circular cage.

Catwalks

4.44.5 (1) Each jib shall have a continuous, unbroken catwalk, not less than 300 mm wide and constructed of non-skid materials.

(2) A single handline, not less than 10 mm (⅜") wire rope, supported at 1 m minimum height at intervals not exceeding 3 m, shall be provided on both sides of a catwalk, not more than 300 mm from the outside edges.

Operator's Control Cab

4.44.6 An operator's control cab may be installed on the boom or jib of a tower crane provided that the design, construction, and installation are acceptable to the crane manufacturer, or certified by a professional engineer.

Counterweights

4.44.7 (1) The counterweights used shall be as specified by the manufacturer.

(2) Counterweight elements, of solid construction, shall be accurately weighed by a public weigh scale or other method approved by the chief inspector.

(3) The weight shall be clearly and durably marked on each element.

(4) The total weight of the counterweights installed shall be entered in the equipment logbook prior to the equipment being put into operation.

Anemometers

4.44.8 (1) An anemometer shall be mounted on the crown, apex, or operator's cab of a tower crane which is most exposed to the wind.

(2) The anemometer readout shall be located in the operator's cab.

(3) Tower crane operations shall be suspended when the maximum allowable wind velocity, as specified by the manufacturer, is exceeded or when a particular load cannot be safely handled.

(4) In the absence of manufacturer's specifications, the maximum wind velocity at which a tower crane can be operated is 50 km/h.

Low Temperature Operations

4.44.9 At temperatures of minus 18 degrees Celsius or lower, and in the absence of manufacturer's specifications, a professional engineer shall determine the operating limitations of a tower crane.

Overlapping Zones for Tower Cranes

4.44.10 (1) Tower cranes whose operating zones overlap, shall be erected at staggered heights so that not less than 1 m is maintained between all crane components under all conditions of loading.

(2) Where an obstruction prevents a tower crane from slewing in all directions

- (a) an audible warning device shall be installed to indicate its proximity to the obstruction, and
- (b) an unattended crane shall have its jib secured in a position facing downwind in line with any anticipated prevailing winds.

(3) Where the jib tip clears an obstruction, a clearance of not less than 1 m shall be maintained under all conditions of loading.

(4) Tower cranes and other moving equipment, operating where they could interfere with each other, shall be provided with effective two-way radio communication.

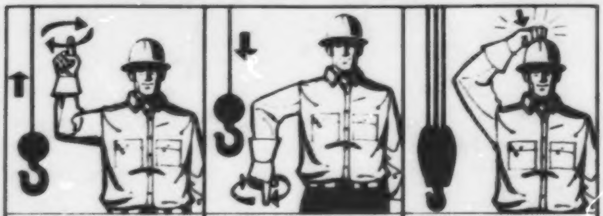
Requirements Prior to Erection

4.44.11 (1) Prior to erection, the structural elements and components of a tower crane shall be inspected for soundness by a qualified person using accepted methods of non-destructive testing. Any repairs that are necessary shall be certified by a professional engineer.

(2) When a tower crane remains on the same site for more than one year, a visual inspection shall be carried out by a professional engineer at least annually. On the basis of these inspections and any necessary repairs, the crane shall be re-certified by a professional engineer.

(3) When a tower crane remains on the same site for more than two years, the structural elements and components of the crane shall be inspected every second year by a qualified person using accepted methods of non-destructive testing. On the basis of these inspections and any necessary repairs, the crane shall be re-certified by a professional engineer.

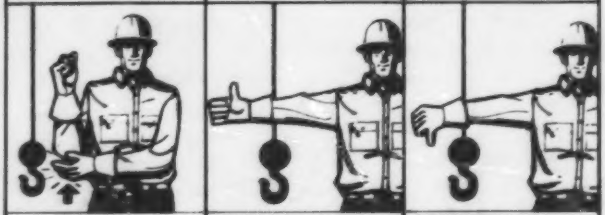
Standard Hand Signals for Controlling Crane Operations, Crawler, Locomotive and Truck Cranes



HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circles.

LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.

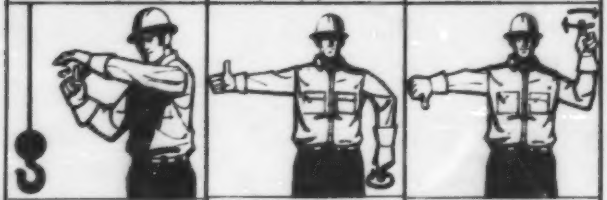
USE MAIN HOIST. Tap fist on head; then use regular signals.



USE WHIPLINE. (Auxiliary Hoist). Tap elbow with one hand; then use regular signals.

RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.

LOWER BOOM. Arm extended, fingers closed, thumb pointing downward.



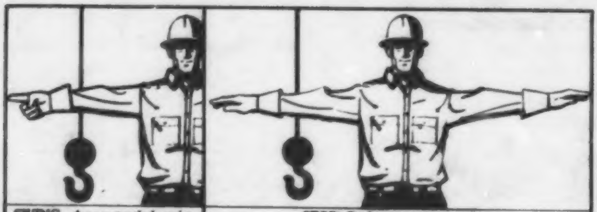
MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)

RAISE THE BOOM AND LOWER THE LOAD. Arm extended, fingers closed, thumb pointing upward, other arm bent slightly with forefinger pointing down and rotate hand in horizontal circles.

LOWER THE BOOM AND RAISE THE LOAD. Arm extended, fingers closed, thumb pointing downward, other arm with forearm vertical, forefinger pointing upward and rotate hand in horizontal circles.

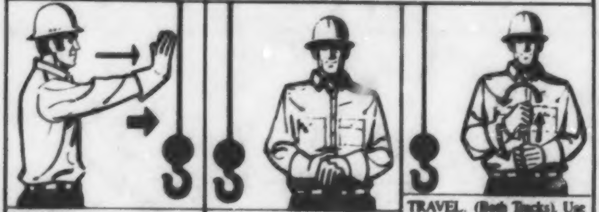
FIGURE 1

Standard Hand Signals for Controlling Crane Operations, Crawler, Locomotive and Truck Cranes



SWING. Arm extended, point with finger in direction of swing of boom.

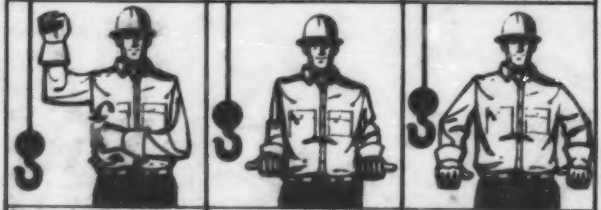
STOP. Both arms outstretched at the sides horizontally, fingers outstretched.



TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

DOG EVERYTHING. Clasp hands in front of body.

TRAVEL. (Both Tracks). Use both fists in front of body, making a circular motion about each other, indicating direction of travel; forward or backward. (For crawler cranes only.)



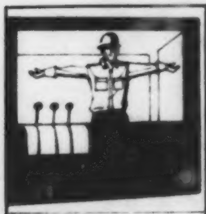
TRAVEL. (One Track). Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For crawler cranes only.)

EXTEND BOOM. (Telescoping Booms). Both fists in front of body with thumbs pointing outward. One hand signal may be used.

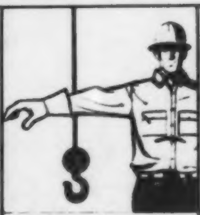
RETRACT BOOM. (Telescoping Booms). Both fists in front of body with thumbs pointing toward each other. One hand signal may be used.

FIGURE 1

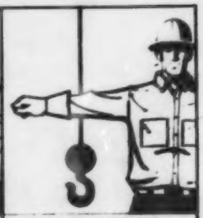
Standard Hand Signals for Controlling Crane Operations, Crawler, Locomotive and Truck Cranes



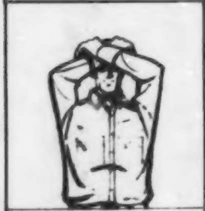
MAGNET IS DISCONNECTED. Crane operator spreads both hands apart — palms up.



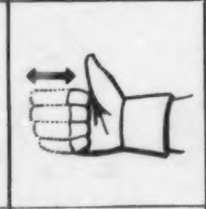
OPEN CLAM SHELL BUCKET. Arm extended, palm down, open hand.



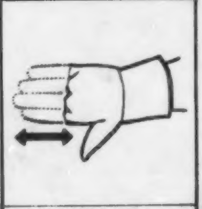
CLOSE CLAM SHELL BUCKET. Arm extended, palm down, close hand.



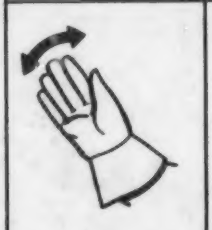
HOIST SLOWLY TO CLEAR FOULED LINE. Hands crossed in front, above shoulders, fingers relaxed.



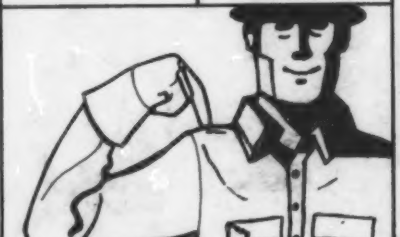
BOOM UP AND LOWER THE LOAD. One hand.



BOOM DOWN AND RAISE THE LOAD. One hand.



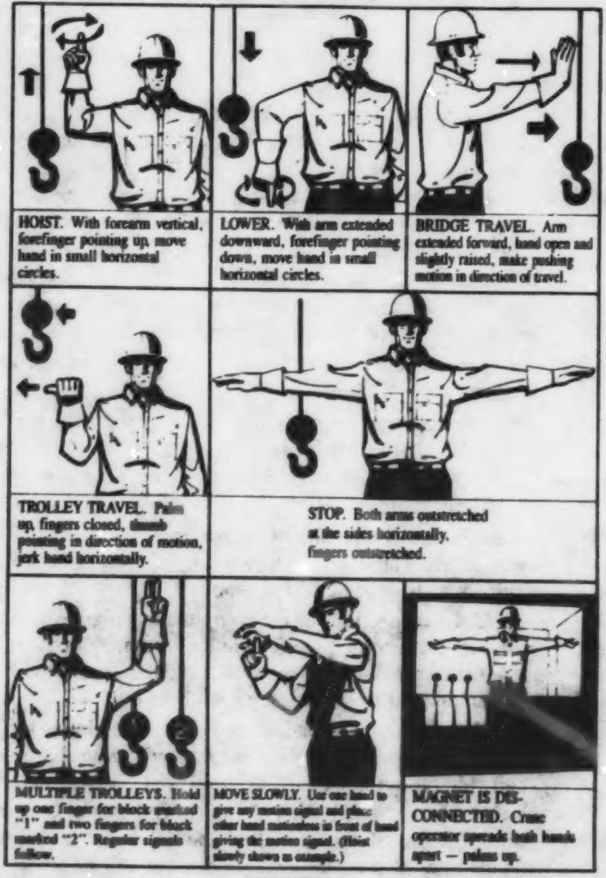
STOP. One hand.



WHIP LINE. One hand.

FIGURE 1

Standard Hand Signals for Controlling Crane Operations, Overhead and Gantry Cranes



HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circles.

LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.

BRIDGE TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

TROLLEY TRAVEL. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.

STOP. Both arms outstretched at the sides horizontally, fingers outstretched.

MULTIPLE TROLLEYS. Hold up one finger for block marked "1" and two fingers for block marked "2". Regular signals follow.

MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)

MAGNET IS DISCONNECTED. Crane operator spreads both hands apart — palms up.

FIGURE 2

Temporary Material Hoists

Definitions

"control devices" include hoist control switches, hoist drum brakes, and hoist signal systems.

"safety devices" include upper and lower travel limit switches, car and counterweight safeties, slack cable devices, landing door interlocks, rope guides, and soft-landing sheaves.

Rated Hoisting Capacity

4.45.1 The net rated hoisting capacity shall be clearly and durably marked upon the structure. A capacity plate shall be located in a conspicuous location in the car and also at the bottom landing entrance.

Hoistway Gates

4.45.2 Hoistway gates shall have positive catches and be interlocked to prevent

(1) movement of the hoist when a gate is open at any landing, and

(2) the opening of any gate other than that at the landing where the platform is located.

Control Devices

4.45.3 (1) Control devices shall be tested daily before operations begin.

(2) Except where otherwise specified by the manufacturer, safety devices shall be tested weekly, other than the slack-cable device which shall be tested monthly.

Inspections

4.45.4 Inspections of the complete installation shall be carried out and recorded weekly, unless the manufacturer recommends more frequent inspections. A logbook shall be provided and maintained in accordance with Section 4.42.6.

Notice Plates

4.45.5 A notice plate shall be conspicuously located on each landing gate and inside the car indicating that no person shall ride on the hoist.

Hoist Operator's View

4.45.6 (1) Where the hoist operator has a clear and unobstructed view of the signaller and all hoist landings, hand signals may be used to control hoist operation.

(2) Where the hoist operator does not have a clear and unobstructed view of all hoist landings, a signal system shall be installed at the operators station and at each hoist landing. The signals shall inform the operator of the landing from which a signal originated and the hoist motion required.

Material Hoist Allowing Persons Access

Chief Inspector's Prior Approval

4.46.1 Subject to prior approval from the chief inspector, material hoists may be used to provide persons with access to work platforms in the maintenance of tall structures such as chimneys and silos.

Handling Personnel

4.46.2 The hoisting equipment shall be of a type approved by the manufacturer as suitable for handling personnel.

Prevention From Falling

4.46.3 The bucket, skip, or cage shall be prevented from falling in the event of a failure of a hoisting component, by means of an automatically applied arresting device operating on at least two separate guide systems.

Suspension and Guide Cables

4.46.4 All suspension and guide cables, supporting structures, slings, and metal fittings shall have a minimum safety factor of 10 based on their ultimate breaking strength.

Positive Drives

4.46.5 The hoisting equipment shall have a positive drive and there shall not be a clutch between the transmission and the hoist drum.

Independent Braking Systems

4.46.6 The hoisting system shall have two independent braking systems, each of which is applied automatically when the controls are in the neutral position.

Hoist Controls

4.46.7 All hoist controls shall be of the "deadman" type, designed to return to the neutral position when released.

Automatic Stop

4.46.8 Each hoist shall have upper and lower terminal stopping devices arranged to automatically stop the bucket, skip, or cage, travelling at normal speed, within the top and bottom travel limits.

Overspeed Governors

4.46.9 The hoisting unit shall be provided with an overspeed governor which will prevent the drum speed from exceeding 120% of its design speed. In no case shall persons be transported at a speed in excess of 75 m/min.

Persons to Be Transported

4.46.10 (1) No more than two persons shall be transported at one time.

(2) No person shall be transported at the same time material is being hoisted.

Miscellaneous Material Hoists

Submission to the Chief Inspector

4.47.1 Permanently installed material hoists not specifically dealt with in this part of the code shall have plans showing the details of the proposed installation submitted to the chief inspector for acceptance before the hoist is installed or put into operation.

Rigging

Use of Riggings and Fittings

4.48.1 Riggings and fittings shall be used only for the purposes for which they were designed and manufactured.

Maximum Rated Loads

4.48.2 The maximum rated load of any rigging or rigging assembly shall not exceed

(1) one-fifth of the ultimate breaking strength of its weakest component, or

(2) one-tenth of the ultimate breaking strength of its weakest component when it is used for supporting persons.

Wedge Socket Connectors

4.48.3 When a wedge socket connector is used as a wire rope terminal, the end of the rope shall be secured to prevent release of the wedge, or rope slippage at the socket.

Open Hooks Not to Be Used

4.48.4 Open hooks shall not be used where dislodgement of the load from the hook would endanger persons.

Securement Against Dislodgement

4.48.5 Shackle pins, heel pins, and similar devices shall be secured against dislodgement.

Sheaves for Running Lines

4.48.6 Sheaves for running lines shall have a means of retaining the rope in the sheave groove.

Protection of Rigging Lines

4.48.7 Rigging lines, slings, and other components shall be protected against cutting, chaffing, and abrasion.

U-bolt Type Cable Clips

4.48.8 (1) When U-bolt type cable clips are used for fastening wire ropes, the U-bolt shall be installed so that it bears on the short or "dead" end of the rope.

(2) The number of clips and their spacing shall be as in Table 48.1.

(3) Where practicable, cable clip nuts or screws shall be torqued to the manufacturer's specifications, or to the values shown in Table 48.1.

Guy-line Anchors

4.48.9 (1) Guy-line anchors shall be so placed that the contained angle between the guy-line and the horizontal plane will not exceed 45 degrees.

(2) Guy-lines shall be so arranged that the strain, in any direction, is shared by at least two guys.

Rope to Be Securely Fastened to the Drum

4.48.10 Unless a rope is required to automatically disengage from a winding drum, it shall be securely fastened to the drum and not less than three full turns of rope shall remain on the drum at all times. A rope shall not be secured to the inside of a drum by knotting or by affixing cable clips.

Removal of Hook From Service

4.48.11 A hook shall be removed from service when

(1) the original throat opening has increased by more than 15% as measured at the narrowest point, or

(2) it has twisted more than 10 degrees from its original plane, or

(3) it has cracks or other defects.

Rigging Removal From Service 4.48.12 Rigging shall be removed from service if it has contacted an electric arc, molten metal or other source of excessive temperature.

Makeshift Fittings 4.48.13 Makeshift fittings, including those made of concrete reinforcing steel, shall not be used for rigging.

Safe Working Load 4.48.14 The safe working load of spreader bars and specialized lifting devices shall be certified by a professional engineer and clearly marked on the equipment.

Reeving Lines 4.48.15 When reeving lines through sheaves or blocks, where failure of the connection between pulling and pulled cables could endanger any person, the two lines shall be connected by a suitable splice, or a cable pulling sock which fully encloses both line ends.

RIGGING
TABLE 48.1

Diameter of Rope		Number of Clips	Spacing Between Clips Centre to Centre		Torque	
Inches	mm		Inches	mm	ft-lb	N m
¼	6	2	1½	38	15	20
5/16	8	2	2	51	30	41
⅜	10	2	2¼	57	45	61
7/16	11	2	2½	64	65	88
½	13	3	3	76	65	88
⅝	16	3	4	102	95	129
¾	19	4	4½	114	130	176
⅞	22	4	5¼	133	225	305
1	25	4	6	152	225	305
1⅛	29	5	7	178	225	305
1¼	32	5	8	203	360	488
1½	38	6	9	229	360	488
1¾	44	7	10½	267	465	630
2	51	8	12	305	650	881
2⅛	54	8	13	330	650	881
2¼	57	8	14	356	650	881

Slings

Requirements

4.49.1 Except for slings which are field assembled in construction operations and which do not have swaged or pressed fittings, all slings made of chain, fibre webbing, wire rope, or which use swaged or pressed fittings, shall at the time of their assembly be permanently and legibly marked with the safe working load and the manufacturer's identification.

Lang's Lay Wire Rope Not to Be Used

4.49.2 Lang's Lay wire ropes shall not be used for slings.

Chain and Chain Slings

4.49.3 Chain and chain slings which have stretched or have links that are deformed, cracked, nicked, gouged, corroded, pitted, or burnt, shall be removed from service.

Minimum Allowable Chain Size

4.49.4 If the minimum allowable chain size at any point on a link is less than that specified in Table 50.1, the chain or chain sling shall be removed from service.

Fibre Webbing Slings

4.49.5 Fibre webbing slings with nicks, cuts, burns, or other damage or defect shall be removed from service.

Removal of Wire Ropes From Service

4.49.6 Wire ropes shall be removed from service when

(1) in running ropes, 6 randomly distributed wires are broken in 1 rope lay, or 3 wires are broken in 1 strand in any 1 lay, or

(2) in standing ropes and slings, there are more than 2 broken wires in 1 lay in sections between the end fittings.

SLINGS
TABLE 49.1
MINIMUM ALLOWABLE CHAIN SIZE AT ANY POINT ON LINK

CHAIN SIZE		MINIMUM ALLOWABLE CHAIN SIZE	
6.3 mm	1/4 in	5.9 mm	15/64 in
10 mm	3/8 in	8 mm	19/64 in
13 mm	1/2 in	10 mm	25/64 in
16 mm	5/8 in	12 mm	31/64 in
19 mm	3/4 in	15 mm	19/32 in
22 mm	7/8 in	18 mm	45/64 in
25 mm	1 in	21 mm	13/16 in
29 mm	1-1/8 in	23 mm	29/32 in
32 mm	1-1/4 in	25 mm	1 in
35 mm	1-3/8 in	28 mm	1-3/32 in
38 mm	1-1/2 in	30 mm	1-3/16 in
44 mm	1-3/4 in	36 mm	1-13/16 in

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Application of Electrical Rules

Codes and Standards

5.1.1 Unless modified by this code, all electrical equipment shall be installed, maintained and operated in accordance with CSA Standard CAN3-M421-M85 in conjunction with the Canadian Electrical Code, as amended from time to time.

Notices and Information

All Mines

5.2.1 (1) The manager shall advise the chief inspector prior to the introduction and use of electrical energy at any mine or prior to increasing the capacity of an existing installation by more than 500 kva, and the system shall not be energized until written permission has been obtained from the chief inspector.

(2) The application referred to in subsection (1) shall

(a) show the areas at the mine where the electrical energy is to be transmitted and used including a schematic drawing approved by a professional engineer, and

(b) if the electrical energy is to be used underground, show the dimensions of the mine opening in which the supply cables will be installed and the clearances around the electrical equipment in distribution stations.

Underground Coal Mines and Hazardous Locations

5.2.2 No electrical energy shall be introduced or used in an underground coal mine or in a hazardous location as defined in the Canadian Electrical Code, without the written approval of the chief inspector.

Certification

5.2.3 The manager of a coal mine, when installing electrical equipment underground, shall

(1) if the equipment is new, ensure that it has been certified by the Canadian Explosives Research Laboratories, Energy, Mines, and Resources Canada (EM&R) as suitable for use in an underground coal mine,

(2) if the equipment is not new and has been obtained from a source outside of his control, ensure that the equipment was originally certified by EM&R and that it still complies with the original requirements, and

(3) if the equipment has been used but was never certified by EM&R, ensure that proper certification is obtained before it is put into service.

Hazardous Locations

5.2.4 The manager shall ensure that all electrical equipment used in a hazardous location, as defined in the Canadian Electrical Code, is approved for use in such a location and for the specific gas, vapour, or dust that is or may be present.

Inspection and Maintenance of Power Systems in Underground Coal Mines and Hazardous Locations

Manager's Responsibility

5.3.1 The manager of a coal mine shall

(1) submit to the chief inspector for his approval an inspection and maintenance schedule for all electrical equipment in use underground or in any hazardous location, as defined by the Canadian Electrical Code, and

(2) designate qualified persons to make the inspections and carry out the maintenance as described in the approved schedule.

Repair of Power System

5.3.2 At any place in an underground coal mine, or in any hazardous location where flammable gas could accumulate, the repair, adjustment, or replacement of electrical equipment shall only be carried out

(1) after the equipment has been disconnected from the power supply and is electrically dead, and

(2) in a location where the electrician doing the work is satisfied that no dangerous concentration of flammable gas is present.

Flammable Gas Warning

5.3.3 Where electrically powered machinery is being operated at a coal face in an underground mine, or in any other location where an inspector considers that flammable gas could accumulate in dangerous amounts, the manager shall ensure that an automatic gas detector of a type approved by the chief inspector is available to continually monitor the air in the vicinity of the machinery, and to give an audible or visual warning whenever a predetermined percentage of flammable gas is present.

Isolating Switchgear

Isolating Underground Workings

5.4.1 Switch gear shall be provided at the surface of the mine for isolating all underground electrical circuits and a person authorized to operate the switch gear shall be available whenever the circuits are energized.

Lockout Procedures

Working on Equipment

5.5.1 Whenever a person services, repairs, or performs any other work on, or near, non-operating machinery, equipment, or apparatus which could endanger persons if it should unexpectedly or accidentally be started up or energized, then the lockout procedures of section 4.11.2 of the code shall apply.

Trailing Cable Use and Repair

Protective Equipment

5.6.1 Whenever a person is handling an energized trailing cable, he shall use suitable protective equipment.

Defective Cable

5.6.2 Damaged cables shall be inspected by a qualified person before they are returned to service, to ensure that they are in safe operating condition and defective cables shall be removed from service.

Cable Repair **5.6.3** All permanent repairs to damaged trailing cables shall be made by a qualified person who shall examine and test the trailing cables before they are allowed to go back into service.

Submersible Pumps

Ground Fault Protection **5.7.1** A submersible pump that is supplied by a portable trailing cable shall be provided with ground fault protection to limit ground fault current to a maximum of 25 amps and automatically isolate the supply in the event of a ground fault.

Supply Systems for Mobile Electrical Equipment

System Testing **5.8.1** Supply systems for mobile electrical equipment shall be tested before being put into service, and at least once a year thereafter, in order to prove the effectiveness of the ground fault tripping and the ground conductor monitoring circuits.

Record of Testing **5.8.2** A record of the tests required under section 5.8.1 shall be kept at the mine and be available for examination by the inspector.

Annual Report

5.9.1 The manager shall submit an annual report to the chief inspector by March 30 that contains the following information

(1) the annual power consumption at the mine, and

(2) the size and type of electrical equipment and apparatus installed at the mine that is over 50 Kw.

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General: Design and Operating Procedures

Definitions

"bench" means a horizontal step or floor above which material is excavated from a contiguous face and upon which drilling, blasting, and material haulage may be carried on.

"catchment berm" means a bench designed to arrest material which sloughs from a face or wall at elevations above the face being worked.

"dump berm" means a barrier or ridge of material other than snow or mud, acting as a guide that will indicate the limit of travel of a vehicle from which material is to be dumped. The height of the ridge shall not be less than one half the height of the tire of the vehicle from which material is dumped.

"dump block" means a barrier of sufficient size and strength and anchored sufficiently to prevent a vehicle from entering an opening while coasting at a speed of less than 2 km/hr.

"dump material" means waste or any material used in the construction of a dump or stockpile.

"dump person" means a person authorized by the manager and stationed on a dump for the purposes of section *6.12* of the code.

"dumping position" means the position of a haulage vehicle when stopped to dump material and is further defined for section 6.12.6(1) as the zones of contact between the dump surface and the rear vehicle wheels closest to the dump berm or edge of the bank.

"face" means a surface of rock, ore, coal, or other material exposed by blasting or excavation which extends from a bench or floor to an upper bench or to the natural land surface.

"haulage road" means a part of a mine used for the transport of coal, minerals, or waste rock.

"open pit shiftboss" means a supervisor who is responsible for an open pit or part of it and holds an open pit shiftboss certificate granted pursuant to the code.

"ramp" means a sloping roadway and in the case of a surface mine, connects two levels of excavation or benches.

"*shoulder barrier*" means a barrier or ridge of material, other than snow or mud, placed along the edge or crest of a surface roadway, ramp, dump or stockpile where vehicles operate and where there is a drop-off of more than 3 m beyond the edge or crest. The height of the barrier shall not be less than ¾ of the height of the largest tire on any vehicle used at that location.

"*surface roadway*" means any part of a mine where vehicles carrying persons, materials, or equipment, regularly travel, and includes a haulage road.

"*wall*" means a surface of rock or material exposed by the excavation of one or more faces and benches in successive horizontal layers.

Work System Approvals

Notice of Intention to Commence Work

6.1.1 The plan of the proposed mining and reclamation work filed with the district inspector in compliance with section 10 (1) of the *Mines Act* for the operations shown in subsections (1), (2) and (3) below, shall consist of a "Notice of Work" form together with such other information on the proposed work as the district inspector may require, and no work shall proceed without a permit issued pursuant to section 10 (3) of the *Mines Act* or an exemption pursuant to section 10 (2)

(1) surface exploration work on a coal or mineral property, except for ongoing exploration within the confines of an existing mine,

(2) any type of placer mining operation including hydraulic monitoring, and

(3) any ty[illegible] mining operation for substances included in the definiti[illegible] a mine in the *Mines Act*.

Underground Exploration Development or Production

6.1.2 An application for permission to commence underground exploration work or any type of development or production work on a coal or mineral property, submitted to the chief inspector and the district inspector in compliance with section 10 (1) of the *Mines Act*, shall be in writing and include a report and plan of the system under which it is proposed to perform the work, and such work shall not proceed until permitted by the chief inspector.

Application Shall Include

6.1.3 The report and plan of the proposed work system referred to in section 6.1.2 shall include the following

(1) a regional map showing the location of the mine property,

(2) a plan at a scale of 1:10,000 or less showing topographic contours, claims, leases or licences, lakes, streams, buildings, roads, railways, power transmission lines, pipelines, and the locations of all proposed mining undertakings and related facilities,

(3) descriptions, design data, and details of the geology and ore reserves, surface mining, roadways, material handling, overburden and waste rock dumps, stockpiles, processing plant and facilities, buildings, tailings transportation and impoundment, and water systems and storage facilities,

(4) the methods to be followed in the construction of haulage roads,

(5) a traffic control plan, showing the maximum allowable speeds for the vehicles in use, rules for passing, "stop" and "yield" locations, priority rules for various vehicles, rules for night operation, maximum operating grades, emergency run-off protection, shoulder barriers, and any other information required by the district inspector,

(6) in addition, for underground developments, detailed maps of present and proposed underground workings, and a plan of surface installations in relation to the proposed or actual mine openings.

6.1.4 The report and plan of the work system required under section 6.1.2 shall

(1) be prepared taking into consideration the safety of the public and the health and safety of persons involved in the work, and

(2) be designed so as to make it as practicable as possible in the future to mine zones affected by the plan.

Departure from Approval

6.1.5 The manager shall notify the chief inspector and the district inspector in writing of any intention to depart from the plan of the work system authorized under section 6.1.2 to any substantial degree, and shall not proceed to implement the proposed changes without the written authorization of the chief inspector.

Notice of Intention to Stop Work

6.1.6 The manager shall give notice to the district inspector of intention to stop work in, at, or about a mine, either permanently, indefinitely, or for a definite period exceeding 30 days, and except in an emergency, the notice shall be not less than seven days.

Mine Surveyors

Mine Surveyors

6.2.1 The manager shall ensure that the surveying of a mine and the preparation of mine plans required by the *Mines Act*, the regulations, or the code is carried out by a qualified person.

Examination of Workings

Examination of Workings

6.3.1 All active workings shall be examined by the certified shiftboss or supervisor with assigned responsibility to ascertain that they are in a safe working condition, as often as the nature of the work necessitates, but at least once during each shift.

Daily Examination and Report Book

6.3.2 The person making the examination under section 6.3.1 shall before going off shift record all unusual and hazardous conditions in a daily examination and report book, and sign the report as a true record of the conditions found. ***For underground mines the record shall include a report on each working place examined.***

6.3.3 The report made under section 6.3.2 shall be read and countersigned by the corresponding supervisor on the oncoming shift and the unusual and/or hazardous conditions discussed with the workers before they are permitted to resume operations in the areas indicated in the record.

Fencing of Excavations and Openings

6.4.1 Surface excavations or openings shall be securely fenced or otherwise protected against inadvertent access.

Suppression of Dust

6.5.1 Wherever practicable, water sprays or other dust suppression devices shall be used at every dusty place where work is carried out and where it is impractical to do so, personal protective equipment shall be supplied and worn by all persons working in that location.

Drilling

6.5.2 A rock drill shall not be used in a mine unless it is equipped with a water jet or other device capable of suppressing dust.

6.5.3 Section 6.5.2 does not apply to drilling by hand steel or to the use of moils for sampling and hitch cutting.

Excavations Near Property Boundaries

6.6.1 The excavation of clay, earth, sand, gravel, or other unconsolidated material in a surface mine shall not be carried on within a distance from the property boundary that is equal to 1.5 times the ultimate depth of excavation in the unconsolidated material, and material that sloughs from within this distance shall not be removed.

6.6.2 Rock shall not be excavated within a distance of 5 m from the property boundary.

6.6.3 The owners of adjoining properties may, by agreement in writing, waive the provisions of sections 6.6.1 and 6.6.2.

Security of Surface Mine Workings

Removal of Unconsolidated Material

6.7.1 All trees and other vegetation, clay, earth, sand, gravel, loose rock, or other unconsolidated material lying within 2 m of the rim of a working face or wall in a surface mine shall be removed, and beyond this distance all unconsolidated material shall be sloped to an angle less than the natural angle of repose.

Pit Face Area Safety

6.7.2 No work shall be carried on, at, or below a face or wall of a surface mine until that face or wall has been examined and declared safe by the shiftboss.

6.7.3 Nothing in section 6.7.2 shall prevent the shiftboss from being accompanied by other persons who may be required to make the face or wall safe.

Bench and Berm Widths

6.7.4 Where a surface mine is worked in benches

(1) each catchment berm shall be designed so that its final width will not be less than 8 m, and

(2) loose rock shall not be allowed to accumulate on a bench or catchment berm in a manner that endangers any person working on a lower bench, and

(3) where loose rock accumulates and where access cannot be gained to clean the catchment berm, and a danger exists to a person working below, a safe working procedure shall be developed that is acceptable to the district inspector.

Surface Mine Faces and Bench Heights

6.7.5 No part of a face or wall of a surface mine shall overhang.

6.7.6 Where unconsolidated material is being worked or removed and could collapse onto the loading equipment, the vertical face shall not be greater than the reach of the loading equipment.

6.7.7 Except where the working face is sloped at an angle acceptable to the district inspector, the height of the working face shall not be more than 2 m above the reach of the mobile powered loading equipment.

6.7.8 sections 6.7.6 and 6.7.7 do not apply

(1) where material is removed by backhoe, excavator, dragline or similar equipment operating from above the face that it is excavating, or

(2) where a multiple bench system of mining is being carried on in accordance with conditions authorized by the chief inspector.

Haulage Roads

Haulage Road Width

6.8.1 (1) The manager shall prepare a plan that is acceptable to the chief inspector under section 10 (1) of the *Mines Act* which shows the type and method of construction for haulage roads that are to be constructed at the mine site.

(2) Except for roads constructed before the coming into force of this section, the manager shall ensure that haulage roads are designed, constructed and maintained to provide

(a) a travel width where dual lane traffic exists, of not less than 3 times, or where single lane traffic exists, of not less than 2 times the width of the widest haulage vehicle used on the road, and

(b) a shoulder barrier

(i) at least 3/4 the height of the ***largest tire on any*** vehicle using the road,

(ii) of a construction or a specification that is acceptable to the chief inspector,

(iii) located and maintained along the edge of the haulage road wherever a drop-off greater than 3 m exists, and

(iv) incorporating breaks that do not exceed the width of the blade of the equipment constructing and maintaining the breaks to allow for drainage and snow clearance.

(3) For the purpose of subsection (2) (a), the width of the barrier referred to in subsection (2) (b) shall be excluded from the travel width.

Vehicle Runaway Protection

6.8.2 On roadways where the grade exceeds 5%, the district inspector may require clearly identified emergency runaway lanes or retardation barriers, placed at suitable locations and capable of bringing runaway vehicles to a controlled stop to be provided and maintained.

Transportation of Persons

Crew Vehicles

6.9.1 Crews shall only be transported in vehicles acceptable to the district inspector, and no person shall ride in a standing position.

6.9.2 Crew buses shall be clearly marked by lighting, painting or other markings that will distinguish them by night and day from other types of vehicles.

6.9.3 No person shall be transported in the box of a pick-up or service truck.

6.9.4 No person shall be transported in the box of a haulage truck or in the bucket of any unit of mobile equipment.

6.9.5 No person shall board or leave any vehicle while that vehicle is in motion.

Qualifications and Responsibilities of Equipment Operators

Operator Training

6.10.1 No person shall operate any equipment, mobile or stationary, unless he has received the minimum training required for that particular equipment pursuant to the training program authorized by the manager under section 1.11.2.

6.10.2 The driver of every rubber tired motor vehicle shall be or have been the holder of a valid British Columbia Class 5 drivers licence or equivalent.

Operator's Responsibility

6.10.3 The operator of any unit of mobile equipment shall be directly responsible for its safe operation and for maintaining full control of the unit and complying with all provisions of the *Mines Act*, the regulations, and the code insofar as the operation of the equipment is concerned, and operators shall wear their seatbelts and drive with their headlights and, where required, ***a flag equipped whip antenna light or a flashing light on at all times.***

Logbook to Be Maintained

6.10.4 A logbook shall be provided and maintained in each unit of mobile equipment over 7 000 kg gross vehicle weight.

Examination of Equipment

6.10.5 The operator of any equipment shall examine and check the equipment before putting it into use and if an unsafe condition is discovered, he shall

(1) note the unsafe condition in the vehicle logbook, and

(2) not operate the equipment until repairs have been made by a qualified person and noted in the logbook, or

(3) the qualified person has assured him it is not unsafe to operate the vehicle and noted the reason in the logbook

6.10.6 If no unsafe condition or problem is experienced, the operator shall also record this in the logbook.

Operator to Read Logbook

6.10.7 Prior to operating any unit of mobile equipment, the operator shall read any entries made in the logbook and, if an unsafe condition has been recorded but not corrected, he shall not operate the equipment until repairs have been made by a qualified person and noted in the logbook, or the qualified person has assured him it is not unsafe to operate the vehicle and has noted the reason in the logbook.

6.10.8 The manager shall ensure that the logbook system is working effectively.

6.10.9 A maintenance record shall be kept of all unsafe conditions reported and the repairs made to each individual piece of mobile equipment to correct unsafe conditions.

Name of Person

6.10.10 Every notation made in the logbook, maintenance record, and every other record relating to the condition of the equipment shall show the time and date of the entry and the name of the person who made the entry.

Control of Vehicular Movement

Restricted Vision

6.11.1 No person shall operate a unit of mobile equipment where his field of vision is restricted unless he

(1) has inspected the area into which the equipment is to be moved and, without delay, proceeds to operate the equipment, or

(2) is directed by a signal man who is located in a safe position and in continuous contact with the operator of the equipment, or

(3) is directed by a traffic control or warning system.

Disabled Vehicle

6.11.2 When a vehicle or a unit of mobile equipment is disabled or parked in the travelled portion of a roadway

(1) a warning to approaching traffic shall be given by means of flashing lights, flares, lamps, or reflectors, or

(2) a person, equipped to be clearly visible and identifiable, shall direct other vehicles using that section of roadway.

Precautions When Dumping Material

Dump Block

6.12.1 A dump or stockpile area on the surface of a mine shall be examined by either the open pit shiftboss or a qualified person appointed by the manager

(1) before material is permitted to be dumped where dumping has not been carried on for a period of 4 hours or more, and

(2) at least once and at intervals of not more than 4 hours during each shift when material is being dumped, and

(3) the person who conducts the examination shall record the details of the examination and any reports from a dump person in the daily examination and report book referred to in section 6.3.2, and

(4) communicate verbally any abnormal or hazardous conditions to the dump person.

Dumps, Roads and Ramps — Manager's Responsibility

6.12.2 The manager shall

(1) prepare a generic plan acceptable to the chief inspector pursuant to section 10 (1) of the *Mines Act* for dumps, roads, or ramps that are to be constructed as part of a dumping operation,

(2) ensure that the construction is in accordance with the accepted plan and any modification to the plan that has been accepted by the chief inspector,

(3) communicate the accepted plan and any modifications to those persons responsible for and employed in the construction,

(4) where material is to be dumped from a vehicle into a bin, raise, or other opening, provide and maintain a barrier of sufficient size and strength and anchored sufficiently to prevent the vehicle from inadvertently entering the bin, raise, or opening,

(5) where dumping is prohibited or hazardous, prevent dumping by placing across the entrance a barrier sufficient to prevent access and a sign that reads "No entry for dumping purposes", and

(6) ***appoint qualified persons to act as dump persons.***

Fly Spreading

6.12.3 Where it is proposed to discharge material from the elevated box of a moving haulage truck, the manager shall prepare a draft procedure and submit it to the chief inspector for acceptance.

Dump Stability

6.12.4 No person shall drive or operate a haulage vehicle in such a manner as to

(1) dump from the vehicle at a location where he has reasonable cause to believe that the ground is not capable of supporting the loaded vehicle, or

(2) remove material from the bottom of a dump or stockpile if he has reasonable cause to believe that a person may be injured as a result of the removal.

Dumping over Bank

6.12.5 No person shall drive or operate a haulage vehicle, in such a manner as to dump material from the vehicle over a bank that is more than 3 m high, or dump within 3 m of the ***dump berm crest when the bank is more than 3 m high,*** except as described in section 6.12.2 (4), unless a dump person is directing vehicles to the dumping ***position*** and a dump berm is in place.

Reversing when Dumping

6.12.6 The driver of a haulage truck shall not

(1) where the ***bank*** is more than 3 m high ***and the dumping position is*** within 3 m of the ***dump berm*** crest, move the vehicle backward to the ***dumping position*** or begin dumping until he has received verbal directions, or standard visual ***signals as shown in figure 6–1*** or audible signals acceptable to the district inspector, from the dump person,

(2) operate the vehicle in reverse for a distance greater than 4 truck lengths on a dump other than a bin, raise, or other opening referred to in section 6.12.2 (4),

(3) operate the vehicle in reverse for a distance greater than 4 truck lengths, on a stockpile, ramp, road, or a ramp or road that is under construction, unless the ramp or road has a positive gradient of more than 5%.

Dump Person

6.12.7 A dump person who is responsible for directing vehicles at a dump point shall

(1) continually ***inspect*** the condition of the dump site and if ***abnormal*** or hazardous conditions are observed take corrective action to alleviate any danger to workers assigned to the dump,

(2) communicate ***immediately any abnormal or hazardous*** conditions found to the open pit shiftboss, ***and***

(3) when directing a vehicle to the dumping position exert due vigilance to ensure the safety of all persons engaged in the dumping operations.

Variance by Inspector

6.12.8 (1) Where satisfied that dumping may be carried out in a safe manner, the district inspector, after following section 1.2.1, may order a variance pursuant to section 10 (2) of the *Mines Act* from sections 6.12.5, 6.12.6 and 6.12.7.

(2) Where the district inspector has ordered a variance from the requirements of sections 6.12.5, 6.12.6 and 6.12.7, the manager shall clearly display the order on notice boards at the mine.

Working Plans

Duty to Keep Plans

6.13.1 The manager shall keep at the mine site accurate plans that are updated every 3 months and are prepared on a scale that accords with good engineering practice, as follows

Surface

(1) a surface plan showing the claims, licences or leases on which mining is being carried out, and all lakes, watercourses, naturally unstable ground, such as peat bogs or sloughs, main roads, railways, power transmission lines, buildings, shaft opening, adits, surface workings, diamond drill holes collared on the surface, dumps, dams, tailings ponds and their overflow channels, and topographic contours,

Underground

(2) a separate underground plan of every level showing all workings, including shafts, tunnels, diamond drill holes over 7 m long, dams, bulkheads, electrical substations, explosives storage, shop areas, and permanent seals and stoppings,

Sections

(3) vertical mine sections at suitable intervals and azimuths, showing all shafts, tunnels, drifts, sloped roadways, rooms, stopes, ***diamond drill holes*** and the location of the top of the bedrock, surface of, and type of, the overburden and the bottom and surface of any known body of water or watercourse,

Ventilation

(4) a ventilation plan showing the normal direction and volume of the main air currents and the location of permanent fans, ventilation doors, stoppings and connections with adjacent mines,

Electrical

(5) a plan indicating the position of all fixed electrical apparatus in the mine and the routes of all fixed power feeders and fixed branch feeders, properly rated and referenced, and the rating of all electrical feeder control apparatus and equipment,

Emergency

(6) an emergency and rescue plan of the workings of the mine, satisfactory to the district inspector, on which the main routes of egress from the active workings, sites of all underground refuge stations, and ventilation as required in section 6.13.1 (4) are clearly shown.

Duty to Post Plans

6.13.2 The manager of every underground mine shall post, or have posted, in a conspicuous place accessible to all persons working underground, a copy of the current emergency and rescue plan required by section 6.13.1 (6), and a copy shall be sent to the district inspector and the OHSC.

Copy for Inspector

6.13.3 The manager of an operating mine shall, upon request, supply the district inspector with an accurate and up-to-date copy of the plan of the underground workings.

Failure to Post Plans

6.13.4 If the manager fails to provide the plans required by section 6.13.1, the district inspector may have the mine surveyed and the plans prepared, and the costs of the survey and the preparation of the plans may be recovered from the owner or agent.

Shiftboss Responsibility for Plans

6.13.5 (a) The manager shall ensure each shiftboss is provided with current development plans for the assigned area of responsibility indicating the size, dip and length of all development openings. The plans shall clearly indicate points where openings are or will be within 8 m of a breakthrough for the purposes of section 8.10.2.

(b) The shiftboss shall ensure the mining crews are informed of those possible breakthrough points.

Pillars

Boundary Pillar

6.14.1 A pillar of not less than 30 m shall be maintained on either side of a party boundary between adjoining underground mining properties.

6.14.2 The owners of adjoining properties may, by written agreement, waive the provisions of section 6.14.1, provided that they inform the district inspector.

6.14.3 If the owners fail to reach an agreement under section 6.14.2, the chief inspector may, upon application from a manager, authorize the mining of a pillar.

Shaft Pillars

6.14.4 No stoping shall be done within 60 m of a shaft that is used for transporting persons, unless the chief inspector has so authorized.

Mine Openings

Two Exits **6.15.1** Where an underground mine has been opened by means of an adit, tunnel, or shaft, a second or auxiliary exit shall be provided prior to production.

Distance Between Exits **6.15.2** An auxiliary exit shall not at any point be less than 30 m from the main entrance to underground workings of the mine and shall be separated by solid strata.

Auxiliary Exit **6.15.3** Before stoping is started in any part of a mine, a second or auxiliary exit shall be provided to the working place in that stoping block, or it shall be demonstrated to the satisfaction of the district inspector that a single exit would always be open.

Ease of Travel **6.15.4** An auxiliary exit shall afford easy passage and be provided with good and substantial ladders from the deepest working to the surface, or with hoisting apparatus which shall constantly be available for use.

New Mine **6.15.5** Where an underground mine is being developed after the enactment of the code, shafts and raise openings to the surface shall be provided with a collar of concrete, or other material acceptable to the district inspector, secured to the bedrock.

Refuge Stations

Location of Refuge Station **6.16.1** Where a workplace in an underground mine is more than 300 m from ***a mine portal*** or from a shaft station which is used to access that workplace, the manager shall provide and maintain, in a suitable location for that workplace, a refuge station in accordance with section 6.16.3.

Exemptions **6.16.2** Section 6.16.1 does not apply to a mine under initial adit development or during shaft sinking operations.

Construction and Equipping

6.16.3 Every refuge station shall be

(1) clearly identified, constructed of non-combustible material, and of sufficient size to accommodate all persons working in the vicinity,

(2) equipped with a supply of air, a supply of water, a means of communicating with the surface, a means of sealing to prevent entry of gas, first aid equipment, and emergency lighting, and

(3) equipped with a plan of the mine clearly showing all emergency exits.

Bulkhead or Dam

Plans for Dams and Bulkheads

6.17.1 The manager shall ensure that no structure for impounding water, restraining saturated material or confining air under pressure in any underground roadway or opening is constructed unless the plans and specifications have the prior written acceptance of the district inspector.

Exceptions

6.17.2 Section 6.17.1 does not apply in the case of a small structure less than 1 m in height used solely for

(1) diverting the ordinary drainage on a mining level, or

(2) storing water for mining purposes.

Temporary Dams or Bulkheads

6.17.3 Notwithstanding section 6.17.1, a temporary dam or bulkhead may be constructed without prior approval in an emergency, but no person shall be allowed to work in any part of the mine that could be affected by the construction or failure of the dam or bulkhead until an inspector has examined and accepted it.

Standard of Ventilating Air

Ventilation Standards

6.18.1 The manager of every underground mine shall ensure that the air in all parts of the mine where persons are working or travelling, or may work or travel, is free from injurious or dangerous concentrations of noxious gases and contains sufficient oxygen to obviate danger to the health of anyone in the mine.

6.18.2 Any concentration of a contaminant in excess of the permissible concentration indicated in Part 2, Appendix Table 2-1 of the code, may be classed as injurious or dangerous.

6.18.3 At every underground mine employing 50 or more persons, the manager shall appoint a qualified person to be responsible for all aspects of ventilation in the mine.

6.18.4 The return air from all working places shall, whenever practicable, be routed directly to the return airway.

Barometer

6.18.5 A barometer and a thermometer shall be placed in a conspicuous position at the entrance of an underground coal mine, and both shall be read as part of the duties of the persons appointed to examine the mine workings under section 6.3.1.

Interruptions to Main Ventilation

Interruption to Main Fan

6.19.1 If the main system of ventilation for an underground mine is stopped, other than through a brief interruption of the power supply, all persons shall be withdrawn to the surface of the mine or to an approved refuge station in accordance with the manager's emergency procedures, and there shall be no entry of persons until the ventilation has been restored and the workings inspected and declared safe by an authorized person.

Heating of Mine Air

Mine Air Heaters

6.20.1 No furnace or device for heating mine air shall be installed without the written permission of the chief inspector.

Auxiliary Ventilation

Provision of Ventilation

6.21.1 The manager shall ensure that every mine working that is advanced more than 20 m from the main ventilation circuit, and every raise and sub-drift more than 10 m from the main ventilating circuit shall be provided with suitable, effective auxiliary ventilation.

Development Headings

6.21.2 The manager shall ensure that means are provided to ventilate effectively the faces of development headings, and the system shall be maintained to ensure the face of the heading is swept by the ventilating air supply.

Manager's Rules

6.21.3 The manager of an underground mine shall prepare rules and procedures for the installation and use of auxiliary ventilation systems and, in the case of a coal mine, for the degassing of headings. A copy of the procedures shall be posted at a conspicuous location at the mine and a copy sent to the district inspector.

No Recirculation of Air

6.21.4 An auxiliary fan shall not be installed or operated in an underground mine other than in accordance with the rules and procedures prepared under section 6.21.3, and the manager shall ensure that

(1) sufficient fresh air reaches the fan at all times to prevent recirculation,

(2) air circulated by the fan is not contaminated with dust or flammable gas in excess of the limits specified in the rules and procedures prepared under section 6.21.3, and that no air containing more than 1.25% by volume of flammable gas passes through or over the fan,

(3) every auxiliary fan shall be electrically connected to ground to prevent the accumulation of an electrostatic charge, and

Aluminum Parts Prohibited

(4) no auxiliary or booster fan shall be installed or operated in an underground coal mine if any of its component parts is made of aluminum, magnesium, titanium or a light metal alloy.

Compressed Air Machine Exhaust

6.21.5 The exhaust from any compressed air machine shall not be considered as ventilation.

Monitoring of Mine Ventilation

Air Measurements

6.22.1 The manager of an underground mine shall ensure that measurements of the quantity of air flowing are taken at the main fan, in all main airways, and at all major ventilation splits at intervals not exceeding 3 months.

Diesel Equipment — Ventilation

6.22.2 In a mine or part of a mine in which diesel equipment is operating underground

(1) measurements of the quantity of air flowing shall be taken at intervals not exceeding once a week,

(2) tests shall be made at least once a shift, in the general body of the air, on the exhaust side of the operating diesel equipment, for nitrogen dioxide and other gases specified by the inspector,

(3) the time-weighted average exposure of a worker to airborne respirable combustible dust shall be no more than 1.5 milligrams per cubic metre of air, and

(4) the worker may request that tests be conducted to determine the volume of air flow, carbon monoxide, nitrogen dioxide, formaldehyde, or respirable combustible dust contents of the atmosphere.

Alternate Monitoring

6.22.3 The district inspector may modify the requirement of 6.22.2 (2) to allow monitoring for oxides of nitrogen rather than nitrogen dioxide and, in this case, the maximum permissible concentration not to be exceeded at any time shall be 5 ppm.

Recording

6.22.4 The measurements required to be taken under sections 6.22.1, 6.22.2 and 6.22.3 shall be recorded in a book kept for that purpose.

Ventilation Doors

Door Closing

6.23.1 All doors used for regulating or controlling ventilation shall close automatically or be provided with a suitable device for opening or closing them.

Ventilation Quantities — Splits and Measurements — Coal Mines

Ventilation Splits

6.24.1 Where necessary for efficient and effective ventilation, every mine shall be divided into separate ventilating splits and no working place shall be ventilated by series ventilation.

Measurements

6.24.2 Air measurements shall be taken to determine the quantity of air circulating

(1) within 90 m from the first normal working place in each split intake,

(2) in the intake and return airways of each ventilating split, and

(3) in the main intake and return airways of the mine.

Recording

6.24.3 The measurements referred to in section 6.24.2 shall be taken once per month and the results shall be entered in a book to be kept at the mine.

Unventilated Workings

Prevention of Access

6.25.1 The manager shall ensure that any part of an underground mine that is not being ventilated shall

(1) be effectively barricaded to prevent inadvertent entry,

(2) be posted with signs warning that entry is prohibited, and

(3) before anyone enters or is permitted to enter that part of the mine, be examined by a qualified person for

(a) oxygen deficiency,

(b) the presence of toxic or noxious gases, fumes, mists, vapours, or dust, and

(c) any other dangerous condition.

6.25.2 All worked out or closed parts of an underground coal mine and those not part of the mine ventilation system shall be sealed with substantial stoppings.

Stoppings in Coal Mines

Stopping Construction

6.26.1 All stoppings between intake and return airways shall be of substantial construction and built in a manner to prevent any undue leakage of air.

6.26.2 The space between the faces of all stoppings and the airways shall be kept free of obstructions.

Monitoring

6.26.3 Provisions shall be made for monitoring the conditions behind stoppings.

Ventilation After Blasting

Removal of Fumes

6.27.1 A worker shall not return, or be permitted to return, to a workplace after a blasting operation until he is sure that the gases produced by the explosives have been removed or diluted to a safe degree by the ventilation system. If the worker has reasonable grounds to believe that this has not been achieved, he shall request the shiftboss to test the air with a suitable instrument and explain the results to him.

Flammable Gas — Coal Mines

Gas Detection

6.28.1 Where the district inspector is of the opinion that there is a hazard due to the presence of flammable gas, he may require that a sufficient number of appliances authorized by the chief inspector be provided for the determination of lower percentages of flammable gas than can be detected with a flame safety lamp.

Qualifications

6.28.2 The district inspector may require the manager to appoint a qualified person, who is the holder of an underground coal mine shiftboss certificate, to make regular determinations of the content of flammable gas in the mine air at such locations and at such time intervals as established by the district inspector. The results of the determinations shall be entered in a book kept for this purpose at the mine.

Reporting

6.28.3 If air immediately returning from a split that ventilates a group of active workings, or if air in the main return airway, is found to contain more than 1% of flammable gas as determined with an approved means of detection, the person who detects it shall immediately report his findings to the manager and the manager shall

(1) take immediate steps to improve the ventilation, and

(2) mail a notice of the condition to the district inspector within 24 hours.

Electrical Equipment

6.28.4 (1) If any person finds more than 1.25% of flammable gas in the air in the general vicinity of electrical machinery or equipment he shall either

- (a) report his findings to the supervisor in charge of that part of the mine, or
- (b) cut off the electrical power supply from the machinery or equipment and report the circumstances to the supervisor in charge of that part of the mine.

(2) The supervisor to whom a report is made under subsection (1) shall ensure that the electrical power is cut off from the machinery or equipment and that it is not restored until he is satisfied that it is safe to do so.

Coal Mines — Withdrawal of Persons

6.28.5 (1) Whenever the general body of the air in any workplace or travelway in a mine is found to contain 2.5% or more of flammable gas, the person in charge of that part of the mine shall

- (a) immediately cause all persons in that area and the return airway to be withdrawn to a place of safety,
- (b) inform without delay his immediate supervisor, and
- (c) insofar as it is possible to do so without undue risk, ascertain or have a qualified person ascertain, the condition of the affected area and the return airway and carry out the measures necessary to render it safe.

Examination

(2) Except for the purpose of saving life or rendering the area safe, no person shall be readmitted to the affected area until the person in charge of that part of the mine, or a qualified person appointed by the manager, has examined the area and reported it to be safe.

Recording

(3) Where persons have been ordered to leave an affected area under this section, the person who caused them to leave shall record in a book kept for that purpose at the mine, particulars of the reason for the order, and the person who carried out the examination required in subsection (2) shall report the result of it in that book.

Coal Mines — Prevention of Ignition

Manager's Responsibility

6.29.1 Where a machine is in use at a working face at which gas is liable to be ignited by such use, the manager shall ensure that

(1) the machine is provided with effective means to prevent the ignition, or

(2) an adequate portable fire extinguisher is available at or near the machine.

6.29.2 The manager shall provide a detector that gives an audible and/or visible warning of a hazardous accumulation of flammable gas where electrically powered machinery is used at the coal face or at any other place specified by the district inspector.

Prohibited Metals

6.29.3 Nothing made of, or containing, aluminum, magnesium, titanium, or light metal alloy shall be used in an underground coal mine, except

(1) electrical equipment within a flameproof enclosure, or

(2) in circumstances when there is no possibility of friction or impact.

Coal Mines — Combustible Dust

Treatment

6.30.1 The floor, roof and sides of every road or part of a road that is accessible shall be treated

(1) with water in the manner and at the intervals that will ensure that the dust on the floor, roof, and sides, respectively, is always combined throughout with 30% by weight of water in the intimate mixture, or

(2) with incombustible dust in a manner and at intervals that will ensure the dust on the floor, roof, and sides, respectively, shall always consist throughout of a mixture containing not more than 50% of combustible matter if the volatile matter content of the coal does not exceed 22% as determined by one of the standard methods of analysis and computed on a dry, ash free basis.

Permissible Levels

6.30.2 The maximum permissible percentage of combustible matter under section 6.30.1 (2) shall diminish by 1.5% for each 1% increase of volatile matter of the coal until it has been reduced to 35 in the case of coal having a volatile matter content of 32% or more.

Samples

6.30.3 For the purpose of determining the volatile matter content of the coal under section 6.30.1(2), samples shall be taken either from representative sections of the seam or from a representative quantity of the run of mine coal from the seam.

Methane

6.30.4 The permissible percentage of combustible matter in the dust found in an underground roadway shall be further decreased by one for each increment of 1/10 part of 1% in the methane content of the mine air beyond 1/4 of 1%.

Moisture

6.30.5 The percentage of incombustible dust required under this section may be reduced by an amount equivalent to the percentage of water present in the mixture.

Exception

6.30.6 The obligations imposed by this section do not apply to a roadway, if the natural conditions of it as regards the presence of incombustible dust and moisture are found by tests made in accordance with this section to be such as to comply with the foregoing requirements.

Fineness of Dust

6.30.7 The incombustible dust used for the purpose of this part of the code shall, whenever possible, contain not less than 50% by weight of fine material capable, when dry, of passing through a No. 80 sieve of the Canadian Metric Sieve Series.

Sampling

6.30.8 If the amount of incombustible dust passing through the No. 80 sieve is less than 50%, the percentage of combustible matter specified as being the maximum permissible by sections 6.30.1(2), 6.30.2, 6.30.4 and 6.30.5 shall be decreased proportionately, but the percentage of the fine material shall never fall below 25%.

6.30.9 To obtain the composition of the dust mixture in a road or part of a road, the following procedure shall be adopted

(1) representative samples of the dust shall be collected from the floor, roof, and sides over a section of the road not less than 30 m in length, the sections being not more than 135 m apart in the same roadway, and

(2) each sample collected shall be thoroughly mixed and quartered, and a portion of the mixture shall then be sifted through a No. 315 sieve of the Canadian Metric Sieve Series.

Analysis of Roadway Dust

6.30.10 If the roadway dust is known to contain only negligible percentages of either gypsum or carbonates

(1) a weighed quantity of the dust that has passed through the sieve shall be dried at a temperature of 105 degrees Celsius and the weight lost shall be reckoned as moisture, and

(2) the sample shall then be brought to a red heat in an open vessel until it no longer loses weight, and the weight lost by incineration shall be reckoned as combustible matter for the purpose of the test.

Gypsum

6.30.11 If the incombustible dust applied to a roadway consists of gypsum wholly or in part

(1) a weighed quantity of the sieved dust shall be dried at a temperature between 135 degrees Celsius and 140 degrees Celsius and the weight lost shall be reckoned as moisture, and

(2) the sample shall then be kept at a red heat in an open vessel until complete incineration, and the weight of the residue added to that of the moisture shall be reckoned as incombustible matter and expressed as a percentage of the total weight of sieved dust treated.

Carbonate

6.30.12 If the roadway dust contains an appreciable proportion of carbonates, the following method shall be followed

(1) a weighed quantity of the dust that has passed through the sieve shall be dried at a temperature of 105 degrees Celsius, and one hundred times the weight lost divided by the number of grams of dust submitted to the test shall be reckoned as the percentage of moisture, and

(2) one gram of the sample so dried shall then be treated with dilute hydrochloric acid in a suitable apparatus; the weight lost through the decomposition of the carbonates shall be ascertained and subsequently added to that of the incombustible solid residue of another gram of the same sample having been subjected in an open crucible and for not less than one hour to a temperature exceeding 925 degrees Celsius, and this total, plus the moisture previously determined, shall be recorded as incombustible matter.

Tests to be Recorded

6.30.13 The results of the tests of the roadway dust shall be recorded in a book kept at the mine for the purpose, and three copies shall be made, one of which shall be posted in the mine entrance and the other two sent to the district inspector.

Frequency of Tests

6.30.14 Subject to section 6.30.15, tests of samples of roadway dust, so taken as to be representative of the normal composition of the roadway dust throughout the mine and on the floor, roof, and sides, respectively, shall be made as often as may be necessary, but not less frequently than once in each month.

6.30.15 If the tests made on representative samples of roadway dust show in respect of a mine or part of a mine that the conditions prevailing in it as regards presence of the incombustible dust and moisture comply with this part of the code, and these conditions are unlikely to change, tests of representative samples may be made at intervals not exceeding three months, or at longer intervals approved in writing by the district inspector.

Method **6.30.16** Before the first application of incombustible dust as required by this part of the code, accumulated coal dust shall be removed from the roof, floor and sides of the roadway, so far as practicable.

Exception **6.30.17** section 6.30.16 does not apply to mining operations in coal seams containing less than 7% of volatile matter, as determined by one of the standard methods of analysis and computed on a dry, ash free basis.

Injurious Dust **6.30.18** Incombustible dust that is ineffective or injurious to health shall not be used in a mine.

Coal Mine Explosion Barriers

Type **6.31.1** (1) In any underground coal mine which is dry and dusty, rock dust or water barriers of a type authorized by the chief inspector shall be installed at places designated in a scheme prepared by the manager and authorized by the district inspector.

Order (2) The district inspector may order the manager to prepare a similar, authorized scheme at any mine where the district inspector believes that a hazard may exist from the ignition of flammable gas or dust.

Inspection (3) Where explosion barriers are required in an underground coal mine, the manager shall appoint a person who holds an underground coal mine shiftboss certificate to examine the condition and position of the barriers.

Frequency (4) The person appointed under subsection (3) shall examine the barriers at intervals of not more than 4 weeks and shall report the results of the examination in writing in a book to be kept at the mine.

Other Mines — Combustible Dust

Sulphide Dust **6.32.1** In any underground mine where the sulphur content of the ore is high and a sulphide dust explosion has occurred, the manager shall prepare and implement a scheme, acceptable to the district inspector, for minimizing the danger from a sulphide dust explosion including

(1) provision for ensuring that all persons are removed to a place of safety prior to blasting, taking into consideration the mine layout and the ventilation circuits, and if required by the district inspector, removed to the surface of the mine,

(2) provision for ensuring that all accessible headings, raises, and other workplaces within 30 m of a blasting site are washed down to remove dust prior to blasting, and

(3) any other measures that could reduce the risk of a dust explosion or lessen the consequences if one should occur.

Battery Charging Stations

Battery Charging Stations

6.33.1 In an underground mine, a battery-charging station shall be located in a well ventilated location to prevent the accumulation of flammable gases.

Fire Doors

Fire Doors

6.34.1 In any mine, there shall be a sufficient number of fire doors installed underground to isolate the shaft or other entrance to the mine from the mine workings, and the manager shall submit a plan showing the proposed locations for the approval of the district inspector.

6.34.2 Fire doors shall be

(1) of fire resistant construction and of at least one-hour fire resistance rating,

(2) maintained in proper order,

(3) kept clear of all obstructions so as to be readily usable at all times, and

(4) equipped with a self-closing mandoor to allow the escape of a person trapped behind it.

Oil Stores

Oil Storage Underground

6.35.1 Oil shall not be stored in an underground mine in quantities greater than 500 L unless it is placed in an oil storage enclosure that

(1) meets the requirements of sections 4.3.1, 4.3.2 and 4.3.4 of the code,

(2) is provided with a door,

(3) has a two-hour fire resistance rating, and

(4) is maintained in proper order and kept free from obstruction so as to be readily usable at all times.

Repair and Refueling Depots

Approval

6.36.1 No service garage or fuelling station shall be installed underground unless it meets the appropriate requirements of sections 4.3.1, 4.3.2, and 4.3.4 of the code, and the manager has written permission from the chief inspector.

Flammable Refuse

Removal

6.37.1 All waste, including waste timber, shall be removed from an underground mine on a regular basis and shall not be piled up nor permitted to decay in the mine.

Storage and Removal

6.37.2 In an underground mine, or in or about a headframe or shaft-house, flammable refuse shall be

(1) deposited in covered, fire-resistant containers, and

(2) removed at least weekly from the mine, headframe, or shaft-house.

Records

6.37.3 Every underground shiftboss shall record daily in his logbook any accumulation of flammable refuse and waste timber in his work area.

Care of Mine Workings

Examination

6.38.1 Before any work is begun in an underground mine, a worker shall check his workplace for hazardous or dangerous conditions and he shall not start work until the workplace has been made safe.

Securing Mine Workings

6.38.2 Every place in which work is being carried on or through which persons pass shall be rendered safe for the work or passage.

Protection from Overhead Work

6.38.3 No person shall be allowed in a location underground or on the surface where persons are working overhead, unless suitable measures have been taken for the protection of that person.

Scaling Bars and Gads

6.38.4 The manager shall provide and maintain an adequate supply of properly dressed scaling bars, chute bars, gads, and other equipment necessary for scaling and barring.

Guarding Open Workings

6.38.5 Where persons are working in any location which is below and open to a haulage or travel way on the level above, the workplace shall be securely covered or otherwise closed off from the haulage or travelway.

Guarding Millholes and Manways

6.38.6 (1) The top of every millhole, manway, sump, or other opening shall be covered or otherwise adequately protected to prevent inadvertent access.

(2) Where repair work is being carried out in a manway, or where for any other reason the manway could be dangerous to a person entering it, the manway shall be closed off and warning signs shall be posted at all entrances.

Steeply Inclined Raises

Two-compartment Raises

6.39.1 Except where approved raise driving equipment is used, every raise inclined at more than 50 degrees from the horizontal and being driven more than 16 m slope distance, shall

(1) be divided into at least two compartments, one of which shall be maintained as a ladderway and equipped with suitable ladders maintained to within 12 m of the face as it is being driven, and

(2) if the second compartment is used to hold rock excavated from the face, it shall either be kept full, or suitable protection shall be provided to prevent a person from falling into this compartment.

Inspections of Coal Mines

Shift Inspections

6.40.1 In an underground coal mine a shiftboss shall, within three hours before the beginning of each shift, inspect with a locked flame safety lamp or equivalent device approved by the chief inspector, that part of the mine and roadways leading to it, in, or through which persons may be present or pass, and shall make a true report of the condition of them, and no worker shall enter that part of the mine or roadways until they have been pronounced safe by the shiftboss.

Reports

6.40.2 The report shall be recorded without delay in a book which shall be kept at the mine for that purpose, signed by the shiftboss, and a true copy of it shall be posted at the surface of the mine.

Mid-shift Inspections

6.40.3 A similar inspection of all underground parts of the mine where persons are working shall be made by a shiftboss at least twice in the course of each 8-hour shift, once in the first half and once in the second half of the shift, and there shall be an interval between inspections of not less than two and a half hours in any working place.

Weekly Inspections

6.40.4 At least once in every week the manager shall cause a shiftboss to examine all roadways, air courses, stoppings, sealings, overcasts, and wastes, with a locked flame safety lamp or equivalent device approved by the chief inspector, to make a report, and post a copy of it in accordance with section 6.40.2.

Mine Workings in Potentially Hazardous Areas

Procedure and Approval

6.41.1 No work shall be carried out within 30 m of abandoned or old workings, or any accumulation of water or unconsolidated material, or any other substance that may flow when wet, unless the proposed work procedure has been submitted to and authorized by the chief inspector in writing.

Breakthrough to Mine Workings

6.41.2 Where possible, no connection between mine workings shall be made until a thorough examination of the workings toward which the active heading is advancing has been made and has shown that the work can proceed in a safe manner.

Water or Saturated Material in Ore and Waste Passes

Water Not to Be Introduced

6.42.1 No person shall introduce water into an ore or waste pass, ***a loading pocket, coal silo, hopper, storage bin*** or a completed large diameter borehole for any purpose without prior authorization from the district inspector, unless the chief inspector has authorized an operating procedure.

Procedure for Removal

6.42.2 If any ore or waste pass is found to contain water, or saturated material which will flow, the manager shall provide a plan for the safe removal of such water or saturated material.

6.42.3 The controls of any ore or waste pass shall be arranged, wherever practicable, to prevent the operator from being hit by a run of material.

Stairways

Requirements

6.43.1 Stairways shall be provided in shafts or manways inclined at 50 degrees from the horizontal or less where necessary to ensure safety.

Handrail

6.43.2 Every stairway greater than 1.5 m in height located in a shaft or manway shall be equipped with a suitably placed handrail.

Tread Size

6.43.3 The rise and tread width of the steps within a stairway shall be uniform and tread widths shall not be less than 250 mm.

Guardrails

6.43.4 When a stairway ends in direct proximity to dangerous traffic or other hazards, detour guardrails shall be installed.

Ladders

General Standards

6.44.1 A ladder used in a mine shall

(1) be of strong construction,

(2) where used underground, be securely fastened to the timbering or wall of the shaft, raise, or stope,

(3) be maintained in good repair,

(4) have rungs that are equally spaced,

(5) be installed so that rungs shall be more than 100 mm from the wall or timbering of a shaft, raise or stope, and

(6) be erected at an inclination of not more than 80 degrees from the horizontal unless equipped with safety hoops.

Handrails

6.44.2 Every ladder must project at least 1 m above its landing platform, except where

(1) strong suitable handrails are provided on the platform, and

(2) the ladder is securely fastened to its platform.

Platforms

6.44.3 Where a shaft or manway, driven after the proclamation of this code, is inclined at over 50 degrees from the horizontal, it shall be provided with a ladderway containing platforms erected at vertical intervals not exceeding 7.5 m in the ladderway. Each platform shall have an opening which permits a person wearing a self-contained breathing apparatus to pass through.

6.44.4 Where a shaft or manway is inclined at over 70 degrees from the horizontal, the ladderway, in addition to the requirements of section 6.44.3, shall have the individual ladders between each platform so located that they act as shields or protections to cover the holes in the platforms.

Doors in Platforms

6.44.5 Where it is possible for a person to fall from one platform to a lower platform in a ladderway, the platform openings shall be covered by suitable doors which can be easily opened from above or below.

Flexible Ladders

6.44.6 No person shall use, or allow to be used, a flexible ladder except

(1) in a shaft sinking operation,

(2) in an emergency rescue operation, and

(3) provided that the ladder is safe and secure.

Ladderways in Other Mine Workings

6.44.7 A landing platform shall be installed at all points where ladders are offset.

6.44.8 All ladderways in raises, stopes and manways shall be installed and maintained to reduce the hazard of a person falling.

Travel in Manways With Skips

6.44.9 When a ladderway and a skipway occupy the same compartment in a manway

(1) the ladders shall be adequately protected from material being hoisted,

(2) no person shall travel or be allowed in the ladderway while the skip is in motion except to handle material in the skip, and

(3) sufficient guardrails shall be installed to prevent a person using the ladderway from falling into the skipway.

Transportation on Rail Tracks

Track Haulage on Inclines

6.45.1 The transportation of persons on an incline or slope in a mine by means of track haulage is permissible only if authorized in writing by the chief inspector.

Runaways

6.45.2 Unless exempted by the chief inspector, a car or trip of cars travelling on an inclined haulage way, shall be equipped with adequate safety devices, or be attached to a safety car of approved design, to prevent the car or trip of cars from running away in the event of a failure of the haulage rope or a coupling.

Protective Devices

6.45.3 At the top of a slope, self acting plane or incline, stop blocks, derailing switches, or other suitable apparatus shall be provided to prevent cars from running away.

Protection of Working Place

6.45.4 In an advancing slope or decline there shall be a stop block, derailing switch, or arresting device at a distance not less than 30 m from the working face designed to safely stop a runaway car or cars.

Riding on Cars

6.45.5 No person, unless authorized by the district inspector and the manager, shall ride on or against a car, locomotive, or train in an underground working.

Passenger Cars

6.45.6 Section 6.45.5 does not apply where persons are being transported on or in passenger cars especially provided for that purpose and hauled by mechanical means provided that

(1) if the car does not have a roof, there shall be a clearance of not less than 1.1 m above each seat,

(2) if the car does have a roof, there shall be a clearance of not less than 150 mm above the roof, and

(3) safety chains shall be used between the cars and between the first car and the locomotive, in addition to the normal couplings.

Railway

6.45.7 A track haulage system may be designated by the chief inspector as a railway and in that case, it shall be maintained and operated in accordance with the standards established under the *Railway Act*.

Standards

6.45.8 Rail tracks in use shall be maintained in good safe condition.

Frog in Track

6.45.9 A rail track switch in which a person's foot may become trapped, shall have guards at the frog, guard rail, and switch point to effectively protect against the hazard.

Clearance on Travelways

Rail Haulage Clearances

6.46.1 Subject to section 6.46.3, where track haulage is used the following continuous minimum clearances between the vehicle and the sides of the roadway shall be maintained

(1) 300 mm on one side and 600 mm on the other, and

(2) a minimum of 300 mm clearance shall be maintained above the head of a person travelling on the haulage vehicle and the roof of the roadway or any obstruction in it.

Mobile Equipment Clearances

6.46.2 Where any mobile equipment other than that referred to in section 6.46.1 is operating, a minimum clearance of 2 m in excess of the maximum width of the vehicle shall be maintained. The vehicle shall be fitted with an approved roll-over-protective structure (ROPS) and there shall be maintained a minimum clearance of 300 mm above the head of a person travelling on the vehicle or above the ROPS, whichever is the greatest.

Reduced Clearances

6.46.3 An inspector may permit reduction of the minimum distances set out in section 6.46.1 and 6.46.2, if safety stations are provided at such distances and under such conditions as he approves.

Safety Stations

6.46.4 The safety stations referred to in section 6.46.3 shall

(1) be plainly marked,

(2) be clean and free of obstructions,

(3) be cut as close to perpendicular as is practical to the haulageway, and

(4) if made after the coming into force of the code, be at least

- (a) 1 m in depth, in addition to the clearance between the vehicle and the wall,
- (b) the height of the roadway or 2 m whichever is least, and
- (c) 1.5 m in width.

Falling Object Protection

6.46.5 Falling object protective structures, which may include cabs or canopies, shall be installed on underground equipment when required by the chief inspector, and they shall

(1) have the minimum structural capacity to support elastically a dead weight load of 82 000 kg or 105 kN/m^2 distributed over the plan area of the structure, whichever is less and

(2) be certified by a professional engineer, and

(3) have a plate afixed stating the structure meets the requirements of action 6.46.5 (1).

Haulage Warning Devices

Warning of Approach

6.47.1 The manager shall ensure that where a person or persons are working in a location where mobile equipment may be operating, both they and the operators of the mobile equipment are made fully aware of the other's presence.

Automated Drilling Operations Underground

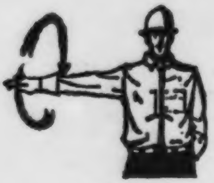
Jumbo Drills

6.48.1 No person shall proceed beyond the front of the drill controls of an underground jumbo drill unless the drills have been stopped.

Figure 6-1

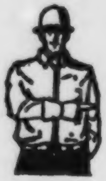
STANDARD HAND SIGNALS FOR CONTROLLING MOBILE EQUIPMENT MOVEMENT

BACKING THE TRUCK UP



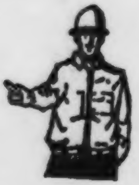
Trucks are guided back to desired dumping positions using a large clockwise circular motion of the right arm. Slow down arm motion as truck nears required dumping spot.

SWING TO THE LEFT



Stopping circular motion and putting right arm across the chest will indicate to the truck driver to swing back of truck to the left. When truck has adjusted direction of travel sufficiently to come to the berm with both rear wheels of the truck the same distance away from the berm, continue circular clockwise motion, as per figure #1.

SWING TO THE RIGHT



Stopping circular motion and pointing arm down the berm to the right side of the truck will indicate to the driver to swing the rear of truck to the right. When truck has made sufficient adjustments to come to a stop with the rear wheels an equal distance from the berm, continue circular clockwise motion as per figure #1.

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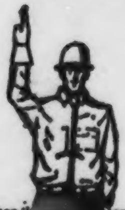
Figure 6-1 (cont.)

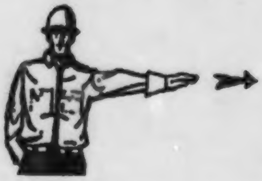
STANDARD HAND SIGNALS FOR CONTROLLING MOBILE EQUIPMENT MOVEMENT

RAISE BOX



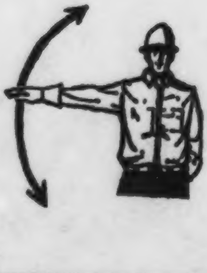
When th[illegible] stopped, raise the arm pointing upward to indicate to the operator to raise the box and dump.

DRIVE FORWARD



On those occasions when it is necessary to direct the haulage truck to move forward (for example to reposition or move away from a parked position), indicate so by pointing your arm and hand straight out away from the berm or dump, and in the direction of forward travel of the truck.

STOP



When the truck has reached the dump position use a straight upward and downward motion of the arm several times in succession to indicate to the truck driver to stop. This motion must be a full 180° from over the head down to the knee.

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Appendix

Appendix 7-1 Mine Shaft Signal Code 47

Definitions

"bail" means the supporting structure for a shaft conveyance whereby the conveyance is connected, through suspension gear, to the hoisting rope.

"cage call system" means an independent, electrically operated signalling system which may be activated at any shaft station and results in audible signals at all shaft stations.

"chair" means a moveable support arranged to hold a shaft conveyance as required.

"destructive testing" means a test on a sample of a shaft rope where the rope or individual wires from the rope are broken by a testing machine.

"electromagnetic device" means a device using an electromagnetic system for examining shaft rope.

"factor of safety (ropes)" means the number of times the breaking strength of a shaft rope exceeds the weight it supports at a specified location of the rope.

"headframe" means a structure at the top of a mine shaft which carries the sheaves for the hoisting ropes.

"hoist" In this part of the code, "hoist" means a hoisting engine used to raise or lower persons, rock or any other material, in a shaft conveyance, through a vertical or inclined shaft.

"hoist signalling system" means an independent, electrically operated signalling system which may be activated at any place within the shaft and results in audible signals at the hoist operator's place of work and at all shaft stations.

"mine hoisting plant" means a mine hoist for an underground mine and includes the prime mover, transmission equipment, head frame, sheaves, ropes, shaft, shaft conveyances, shaft sinking equipment, shaft furnishings, hoist controls, counterweight, signalling and communications equipment, and any other equipment used in connection with a hoist.

"*non-destructive test*" means the examination of a part without subjecting it to physical distortion, damage, or destruction.

"*prime mover*" means a machine or other device that provides an initial source of motive power.

"*reactivated mine hoisting plant*" means a mine hoisting plant that is placed into service after being out of use for a period in excess of one year.

"*safety catch*" means a safety appliance or fitting which transfers the weight of the cage onto the shaft guides if the hoisting rope breaks.

"*safety dogs*" mean those portions of the safety catches which penetrate the shaft guides if the hoisting rope breaks.

"*shaft or winze*" means an excavation of limited perimeter compared with its depth in which persons and material, or both, are transported by means of a mine hoisting plant and includes a winze.

"*shaft casing*" means the continuous steel lining of a shaft.

"*shaft conveyance*" means a conveyance raised or lowered by a mine hoist in a shaft and includes a bucket, a single or multi-deck cage, a skip, or a combination of skip and cage used to transport workers and material, or both.

"*shaft furnishing*" means any installation within the shaft, other than casing and lining, which is required to support the shaft or services therein.

"*shaft lining*" means the timber, concrete, brick or steel structure, or weld mesh, fixed around the shaft to support the walls. This does not imply continuous lining.

"*shaft obstruction*" means any protrusion into a shaft compartment in which hoisting may be carried out.

"*shaft rope*" means any rope used with a shaft hoist installation including a hoisting rope, a balance rope and a guide rope.

"*suspension gear*" means all components necessary to effect a secure attachment between the hoisting rope and the conveyance.

"*work platform*" means a platform attached through suspension gear to the hoisting rope and used by persons performing work in a mine shaft.

"*winze*" (see shaft)

Shafts

Shaft Design

7.1.1 (1) A mine shaft shall

(a) be of a design approved by a professional engineer registered in a mining discipline,

(b) be equipped with a means to guide each shaft conveyance and counterweight through the shaft to prevent contact with another shaft conveyance or counterweight or with any shaft furnishing,

(c) have underwind clearances that exceed the stopping distance of any shaft conveyance when travelling at the maximum speed permitted by the hoist controls and carrying the maximum permitted load, except

(i) during shaft sinking operations, or

(ii) when chairs are used to land a skip during loading operations,

(d) where a friction hoist is installed, be equipped with tapered guides, or other devices approved by the chief inspector, located above and below the limits of regular travel of any shaft conveyance or counterweight, and designed to decelerate and safely stop the shaft conveyance or counterweight in the event of overtravel, and

(e) where a friction hoist is installed and where workers are transported in a conveyance not equipped with safety catches, safety chairs shall be installed in each compartment at the extreme limit of overwind travel; and the installation shall be so arranged so that if a conveyance or counterweight should break away from the rope as a result of an overwind, it would fall back the smallest practicable distance before landing on the safety chairs which, with their supports, shall be designed to stop and hold a fully loaded conveyance under these conditions.

Sump Barrier

(2) Except when a shaft is being sunk, or during sump cleaning operations, a barrier or obstruction shall be installed in the shaft to prevent a shaft conveyance from being lowered into water in the shaft bottom.

Guarding of Shaft Openings

7.1.2 A shaft opening in an underground mine shall be securely fenced, covered, or otherwise guarded.

Shaft Lining

7.1.3 (1) A shaft shall be securely lined and, if necessary, cased.

(2) During shaft sinking operations, the lining, and if necessary the casing, shall be maintained to within 20 m of the bottom of the shaft.

Shaft Compartments

7.1.4 (1) Except during shaft-sinking operations, a shaft compartment used for the handling of material shall be enclosed by a substantial partition at the collar and at all levels, except the side or sides on which material is loaded on or off the shaft conveyance.

(2) The enclosure referred to in subsection (1) shall

(a) extend above the collar and each level a distance of not more than 7 m, or less than the height of the shaft conveyance plus 2 m,

(b) extend below the collar and each level a distance of not less than 2 m, and

(c) conform to the size of the shaft conveyance, allowing for necessary operating clearances.

Shaft Manways

7.1.5 (1) The manway in a shaft shall be separated from the hoisting or counterweight compartments by a partition which complies with section 7.1.5 (2).

(2) Between levels, the partition may consist of metal or other material of suitable weight and mesh to prevent

(a) a falling object from entering the manway, or

(b) the intrusion of an object from the manway into the hoisting compartment.

(3) A safe passageway and standing room for a person outside the shaft shall be provided at all workings opening into a shaft and the manway shall be directly connected with such openings.

Shaft Gates

7.1.6 (1) Except when the hoisting compartment at a shaft station is securely closed off, a substantial gate shall be installed.

(2) The gate required by subsection (1) shall be kept closed except when the shaft conveyance is being loaded or unloaded at the station, and have a minimum of clearance beneath it.

(3) The approach to the shaft shall be designed and protected to prevent inadvertent entry into the shaft of an uncontrolled vehicle.

Shaft Counterweight Compartments

7.1.7 Where a counterweight is used in a shaft, the counterweight compartment shall be enclosed except when the counterweight travels on guides.

Ladders in Shafts

7.1.8 (1) A suitable stairway or ladderway shall be maintained in every shaft.

(2) During shaft sinking operations, if the ladder is not maintained to the bottom of the shaft, an auxiliary ladder shall be provided.

(3) No ladder in a shaft, other than an auxiliary ladder used in shaft sinking operations, shall be installed in a vertical position.

(4) Where it is necessary for persons to perform inspections in a shaft, suitable ladderways, stairways, or platforms shall be provided to permit the work to be carried out in a safe manner.

Shaft Obstructions

7.1.9 (1) Protective devices and procedures shall be used to prevent a shaft conveyance or counterweight from coming into contact with an intermediate shaft obstruction.

(2) A device which may become an intermediate shaft obstruction shall be positively locked out of the shaft compartment to prevent its inadvertent projection into the compartment.

(3) The location of each intermediate shaft obstruction shall be marked on the depth indicator of the hoist.

(4) The procedure for safely working with intermediate shaft obstructions shall be prepared in writing and posted in appropriate locations.

(5) Doors for covering the shaft at the collar, to facilitate the maintenance of a shaft conveyance, are not an intermediate shaft obstruction if

- (a) they are positively latched out of the shaft compartments when not in use, and
- (b) dual lights are installed to indicate to the hoist operator whether such doors are in or out of the shaft compartment.

Shaft Sinking

7.1.10 (1) When the vertical depth of a shaft below the collar exceeds 50 m during shaft sinking operations, including any preliminary underground development being carried out at the same time, a sinking bucket shall be provided for the transport of persons in the shaft.

(2) The sinking bucket shall be not less than 1.07 m high and designed in accordance with section 7.5.2 (1) and 7.5.2 (2).

(3) Where the distance between a head sheave and the shaft bottom exceeds 100 m, a crosshead shall be used with the bucket.

Sinking Crosshead

(4) The crosshead shall

- (a) land on at least two chairs at the bottom crosshead stop to prevent distortion,
- (b) be attached to the rope by a safety appliance to ensure that the bucket is stopped if the crosshead should jam in the shaft, and
- (c) be of a type that encloses the bucket, unless the shaft compartment is tightly lined and the bucket is barrel shaped.

Indicator Lights

7.1.11 Dual lights shall be installed within view of the hoist operator to indicate

(1) that the crosshead and the sinking bucket are descending the shaft together after leaving the dumping position, and

(2) whether the service doors or the dump doors are in or out of the shaft hoisting compartment.

Service Doors

7.1.12 During sinking operations, service doors shall be installed at the collar and at any other place in the shaft in order to cover the shaft compartments where the bucket is loaded or unloaded and the doors shall

(1) automatically latch out by mechanical means whenever removed from the hoisting compartment,

(2) be closed whenever a bucket is being loaded or unloaded with tools or other materials, and

(3) be closed whenever persons are entering or leaving the bucket, except where a closed crosshead is in use that provides equivalent protection for persons.

Dump Doors

7.1.13 During sinking operations, dump doors shall be installed at the bucket dumping position and arranged so as to

(1) prevent a bucket from being dumped when the doors are in the open position,

(2) prevent any material from falling down the shaft when the bucket is being dumped, and

(3) automatically latch out by mechanical means whenever they are removed from the hoisting compartment.

Multi-deck Stages

7.1.14 (1) A multi-deck stage shall not be used for shaft sinking purposes without the prior permission of the chief inspector.

(2) Where a multi-deck stage is used for shaft sinking purposes, it shall be of a design approved by a professional engineer and constructed in accordance with that design.

Filling Bucket

7.1.15 A sinking bucket shall be filled so that no piece of loose rock projects above the level of its rim.

Riding in Bucket

7.1.16 Except during shaft maintenance and inspection operations, every person being transported by a bucket shall ride in the bucket when it is travelling above the bottom crosshead stopping point in the shaft.

Person in Charge

7.1.17 (1) The person authorized to give signals for hoist movement at a shaft sinking operation shall maintain proper discipline of persons riding in the bucket and enforce the permissible loading restrictions of the conveyance permit.

(2) No person shall obstruct the authorized person mentioned in subsection (1) from performing his duties.

Steadying Bucket

7.1.18 A bucket shall not be allowed to leave the top or bottom of the shaft until it has been steadied.

Lowering Bucket

7.1.19 A bucket being lowered to the shaft bottom shall be

(1) stopped at a distance of at least 5 m, and not more than 10 m, above the bottom of the shaft, and

(2) lowered slowly beyond this point only on a separate signal.

Blasting Precautions

7.1.20 (1) During sinking operations, on the first trip carrying persons down the shaft after a blasting operation

(a) the bucket shall not be lowered beyond a point less than 15 m above the blasting set or bulkhead, or beyond any point in the shaft where the health or safety of the persons could be endangered, and

(b) only a sufficient number of persons shall be transported as required to make a proper examination of the parts of the shaft that might have been affected by the blast.

(2) Beyond the point specified in subsection (1), the bucket shall be lowered slowly on signals given by the persons riding in the bucket.

Overhead Protection

7.1.21 During shaft sinking operations

(1) persons may be at the bottom of the shaft during the hoisting and dumping cycles of the bucket, and

(2) no work shall be done in a shaft while persons are in another part of the shaft below such work unless there is a securely constructed covering over a sufficient portion of the shaft to protect the persons below from the danger of falling material.

Permits

Mine Hoist Certificate

7.2.1 (1) No hoist shall be put into service unless a certificate has been obtained from the manufacturer of the hoist or from a professional engineer competent in the design of mine hoists certifying

(a) the maximum rope pull,

(b) the maximum suspended load, and

(c) the maximum unbalanced load in the case of a friction hoist.

(2) No hoist shall be loaded beyond the maximum amount shown on the certificate required under subsection (1).

Mine Hoist Permit

7.2.2 (1) Except for the purpose of testing before being put into service in a particular location, no mine hoist shall be operated without a valid mine hoist permit issued by the chief inspector, a copy of which shall be posted in the hoistroom.

(2) A mine hoist permit is valid only if the hoist is installed, maintained, and operated in compliance with the code and at the location specified in the permit.

Shaft Conveyance Permit

7.2.3 (1) No shaft conveyance shall be used without a valid shaft conveyance permit.

(2) A shaft conveyance permit shall be obtained from the chief inspector, and a copy posted in the hoistroom.

(3) A shaft conveyance permit is valid only if the shaft conveyance is installed, maintained, and operated in compliance with the code and at the location specified in the permit.

(4) No shaft conveyance shall be loaded with more than the maximum number of persons or weight of material specified in the shaft conveyance permit and a notice showing the specified limits shall be posted at the shaft collar.

Commissioning Tests

7.2.4 (1) Commissioning tests shall be conducted on a new or reactivated mine hoisting plant to ensure compliance with the code.

(2) The results of such tests shall be recorded and a copy sent to the chief inspector.

(3) The person responsible for commissioning the mine hoisting plant shall be a professional engineer who shall certify the results of the commissioning tests.

(4) No mine hoisting plant shall be placed into operation prior to the successful completion of commissioning tests.

Maximum Number of Persons in a Conveyance

7.2.5 (1) Subject to subsection (2), the maximum number of persons that may be carried in a shaft conveyance shall be determined as follows

(a) where the clear floor area of the deck of a shaft conveyance is 1.86 square metres or less, there shall be at least 0.19 square metre for each person,

(b) where the clear floor area of a deck of a shaft conveyance is more than 1.86 square metres and less than 4.64 square metres, there shall be at least 0.16 square metre for each person, and

(c) where the clear floor area of a deck of a shaft conveyance is 4.64 square metres or more, there shall be at least 0.14 square metre for each person.

(2) The maximum number of persons that may be carried by a shaft conveyance shall not exceed 85 per cent of the maximum allowable weight of materials divided by 90 kg.

Logbooks

7.2.6 The following logbooks shall be obtained and used for each mine hoisting plant

(1) Electrical Hoisting Equipment Record Book,

(2) Hoisting Machinery Record Book,

(3) Hoistman's Logbook,

(4) Rope Record Book, and

(5) Shaft Inspection Record Book.

Hoist Operator's Certificate

7.2.7 (1) No person shall operate or be permitted to operate a mine hoist unless he has worked a minimum of 3 years at a mine and had at least 1 year of shaft experience, and

(a) is the holder of a current certificate from a medical practitioner stating that he has been examined, and is fit to discharge the duties of a hoist operator, and

(b) is qualified and authorized to operate the hoist or, in the case of a worker being trained as a hoist operator, is under the direct supervision of a qualified and authorized person.

(2) The medical certificate shall expire one year after its date of issue.

(3) Notwithstanding subsection (2), a hoist operator who has suffered from an accident or illness that, in the opinion of the mine manager, might impair his efficiency shall obtain a medical certificate before returning to work.

(4) A record of all medical certificates shall be kept on file and made available to the inspector on request.

Headframes and Sheaves

Headframe Design

7.3.1 A shaft headframe, whether on the surface or underground, shall

(1) have the plans of the design certified by a professional engineer, and

(2) be of sufficient height to provide an overwind distance that exceeds the greater of twice the stopping distance of the shaft conveyance travelling at the maximum speed permitted by the hoist controls, or 3 m.

Sheave Certificate

7.3.2 (1) Before a shaft rope sheave is used, a certificate shall be obtained from the manufacturer or from a professional engineer certifying,

(a) its maximum rated load carrying capacity,

(b) the diameter of rope for which it was designed,

(c) the maximum breaking strength of the rope for which it was designed, and

(d) the maximum amount of groove wear that shall be permitted.

(2) No shaft rope sheave shall be loaded beyond its maximum rated load carrying capacity or used otherwise than in compliance with the certificate required by subsection (1).

Rope and Sheave Grooves

7.3.3 The ratio of the diameter of the sheave groove to the diameter of the shaft rope shall be as required by section 7.6.1.

Sheave Construction

7.3.4 A shaft rope sheave shall

(1) be made of materials that can safely withstand the ambient temperatures where it is installed,

(2) have a groove, or inserts with a groove, which is suitable for the rope being used, and

(3) bear a serial number and the date of its manufacture.

Sheave Shafts

7.3.5 The shaft of a sheave shall be non-destructively tested for flaws by a certified person before being put into service in a particular location, and after installation, in accordance with section 7.9.7.

Ropes

Rope Attachments

7.4.1 (1) Each component of the suspension gear between a shaft conveyance or counterweight and a hoisting or tail rope, and any connections between shaft conveyances, shall have a static factor of safety when new of not less than 10.

(2) Components of a single suspension unit between a hoisting rope and a shaft conveyance shall not be welded.

(3) A shaft rope shall be attached to the suspension gear of a shaft conveyance or counterweight by a closed type device that cannot be inadvertently disconnected.

Rope to Drum Attachment

7.4.2 (1) In a drum hoist installation, the hoisting rope of a shaft conveyance or counterweight shall be attached to the drum of the hoist.

(2) There shall not be less than three rounds of rope on the drum of a drum hoist when the shaft conveyance is at the lowest point in the shaft from which hoisting is possible.

Trial Trips

7.4.3 When the attachments for a shaft hoisting rope are first installed, or reinstalled after dismantling, the following procedures shall be performed before the hoist is put into service

(1) two test trips of the conveyance or counterweight shall be made through the working part of the shaft, with the conveyance carrying its normal maximum load,

(2) the attachments shall be examined by a qualified person upon completion of the two test trips and any necessary adjustments made, and

(3) a record of the test trips, and any adjustments or examinations made, shall be entered in the Hoisting Machinery Record Book by the person or persons making the tests, examinations or adjustments.

Rope Test Certificate

7.4.4 (1) Before a shaft rope is initially installed, or reinstalled, after having been in storage for more than 3 months, the manager shall ensure that

- (a) a 2.5 m representative sample of the rope is destructively tested by a rope testing laboratory approved by the chief inspector, and
- (b) a Test Certificate is issued by the laboratory showing the actual breaking strength of the rope, the percentage elongation at failure and the results of torsion tests performed on individual wires.

(2) When the rope is installed, a copy of the Test Certificate is sent to the chief inspector and the district inspector, with the appropriate pages from the Rope Record Book.

Rope Destructive Test

7.4.5 After a shaft rope has been in service for 6 months on a drum hoist, and at subsequent intervals not exceeding 6 months, the manager shall ensure that

(1) a 2.5 m length shall be cut off from the lower end of the rope above the clamps, the cut ends securely bound and the sample sent for a destructive test to a rope testing laboratory approved by the chief inspector, and

(2) a test certificate showing the information required by section 7.4.4 (2) shall be obtained from the laboratory and forwarded without delay to the district inspector and the chief inspector.

Rope Electromagnetic Test

7.4.6 A qualified person, acceptable to the chief inspector, shall test each shaft hoisting rope throughout its working length with an electromagnetic rope testing device approved by the chief inspector

(1) within 6 months of being put into service and at subsequent intervals of not longer than 6 months, or

(2) at intervals shorter than 6 months if an extrapolation of previous test results indicates that the loss of breaking strength of the rope could exceed 10% before the next regular test, or

(3) at intervals of not longer than 4 months when the rope has been in service for more than 2 years.

Guide and Balance Rope Tests

7.4.7 A qualified person acceptable to the chief inspector, shall test throughout its length with an electromagnetic rope testing device approved by the chief inspector, each balance rope and where practical, each guide rope and rubbing rope in a shaft,

(1) within 12 months of being put into service, and at subsequent intervals of not longer than 8 months, or

(2) at intervals not longer than 4 months if any test indicates a loss of breaking strength exceeding 5% of the breaking strength on the test certificate referred to in 7.4.4.

Records

7.4.8 The date of every electromagnetic test carried out and the results obtained shall be entered in the Rope Record Book required by section 7.2.6.

Copy for Chief Inspector

7.4.9 A record of every electromagnetic test performed, including graphs and their interpretation, signed by the person making the interpretation, shall be sent to the chief inspector within 28 days of the completion of the test or, if the test indicates a loss of strength of the rope in excess of 7.5%, within 14 days.

Special Rope Tests

7.4.10 The chief inspector may require that specimens be cut from a rope that has been taken out of service, and sent for special destructive testing to a rope testing laboratory approved by him.

Rope Not to Be Spliced or Reversed

7.4.11 (1) No rope shall be used as a shaft rope if it has been spliced, reversed, or previously used in a shaft sinking operation without the written permission of the chief inspector.

(2) No shaft rope that has previously been in use shall be installed again in a shaft without the written permission of the chief inspector.

Minimum Rope Diameters

7.4.12 The minimum nominal diameter of a hoisting rope shall be

(1) 16 mm (⅝″) where a shaft conveyance or counterweight is supported by a single rope, and

(2) 13 mm (½″) where a shaft conveyance or counterweight is supported by more than one rope.

Factors of Safety Drum Hoist Ropes

7.4.13 The factor of safety of a hoisting rope installed on a drum hoist shall not be less than

(1) 8.5 at the point where the rope is attached to the shaft conveyance when carrying its maximum permissible load, or to the counterweight,

(2) 5.0 at the point where the rope leaves the head sheave when the shaft conveyance is carrying its maximum permissible load or, the counterweight is at its lowest point of normal travel, and

(3) 7.5 at the point where the rope is attached to a skip or counterweight if the maximum material load being carried is accurately determined by weighing.

Factor of Safety Friction Hoist Ropes

7.4.14 The factor of safety of a hoisting rope installed on a friction hoist shall not be less than the greater of the value obtained from the formula 8.0 minus 0.00164 d, where d is the maximum length of rope, in metres, in the shaft compartment below the head sheave or the friction hoist drum, or 5.5.

Factor of Safety Balance Ropes

7.4.15 The factor of safety of a tail or balance rope shall not be less than 7.0.

Factor of Safety Rubbing Ropes

7.4.16 The factor of safety of a guide or a rubbing rope shall not be less than 5.0.

Rope Record Book

7.4.17 Whenever a shaft rope is installed or removed from service, the appropriate pages in the Rope Record Book required by section 7.2.6, shall be fully completed and a copy sent to the chief inspector and the district inspector.

Rope Not to Be Used

7.4.18 No rope shall remain in service as a shaft rope when its breaking strength is found to be less than the following percentage of the breaking strength shown on the pre-installation test certificate required by section 7.4.4 (2)

(1) in any part of a hoisting rope, 90%,

(2) in any part of a multi-layer, multi-strand balance rope, 90%,

(3) in any part of a single layer, stranded balance rope, 85%, and

(4) in any part of a guide or rubbing rope, 75%.

Rope to Be Removed

7.4.19 Notwithstanding section 7.4.18, no rope shall remain in service as a shaft rope if

(1) the extension of a test piece of the rope has decreased to less than 60% of the original extension shown on the test certificate required by section 7.4.4 (2), and marked corrosion or a considerable loss in wire torsion tests has occurred,

(2) the number of broken wires, excluding filler wires, in any section of the rope equal to one lay length, exceeds 5% of the total number of wires in the rope, excluding filler wires, or

(3) the rate of stretch in a hoisting rope, installed on a friction hoist, shows a rapid increase in the normal rate of stretch recorded during its service.

Conveyances

Certification

7.5.1 (1) A certificate shall be obtained for each shaft conveyance and counterweight showing its

(a) rated load, as certified by a professional engineer, and

(b) serial number, date of manufacture, and the name of the manufacturer.

(2) Each shaft conveyance and counterweight shall be recertified in accordance with subsection (1) every 5 years.

7.5.2 (1) All parts of a shaft conveyance or counterweight, when carrying the rated load, shall be capable of withstanding at least 4 times the maximum allowable design stress without permanent distortion.

(2) The maximum allowable design stress shall be established by good engineering practice and include the effects of

(a) the weight of the conveyance or counterweight,

(b) the rated load,

(c) any impact load,

(d) any dynamic load,

(e) stress concentration factors,

(f) corrosion,

(g) metal fatigue, and

(h) dissimilar materials.

Worker Protection

7.5.3 Where a person performs work from the top of a shaft conveyance or counterweight, the manager shall ensure that there is provided a safe footing, and except when changing shaft guides, ***protection from falling objects***.

Transport of Supplies and Equipment

7.5.4 (1) Shaft conveyances shall be equipped with devices for safely securing any equipment or supplies that are to be transported in the shaft.

(2) Whenever equipment or supplies are being transported in a shaft, they shall be loaded and secured so as to prevent them from shifting.

(3) If equipment is slung underneath a conveyance or crosshead to be transported in a shaft, it shall be suspended in a manner to prevent its contact with any part of the shaft, its lining, or its furnishing.

(4) All components of a suspension system used to sling equipment underneath a conveyance or crosshead being transported in a shaft shall be capable of withstanding, without permanent deformation, at least 4 times the maximum allowable design stress determined in accordance with section 7.5.2 (2).

Transporting Persons

7.5.5 Except during shaft sinking operations, when a shaft exceeds 60 m in vertical depth a suitable shaft conveyance shall be provided for the transport of persons in the shaft.

Cage Requirements

7.5.6 A cage that is used for the transport of persons in a shaft shall

(1) where it is supported by a single rope or a single point of attachment, be equipped with safety catches and mechanisms as prescribed in section 7.5.11,

(2) except on any side with a door, be enclosed by steel sheet at least 3 mm thick or by material of equivalent strength,

(3) be adequately ventilated,

(4) have a hood made of steel plate, at least 5 mm thick or of material of equivalent strength,

(5) have an internal height greater than 2.1 m,

(6) have a clearance at the door greater than 1.8 m, and

(7) where practical, have an exit in the roof, which can be opened from inside or outside the cage, through which persons can pass.

Cage Doors

7.5.7 The doors on a cage that is used to transport persons in a shaft shall

(1) be at least 1.5 m in height,

(2) be mounted and arranged so that they cannot be opened outward from the cage,

(3) be of solid construction except for a viewing window,

(4) be arranged so that they can be closed whenever persons or materials, other than rolling stock, are being transported in the cage,

(5) be installed so that there is only enough clearance at the floor to allow them to be readily opened and closed, and

(6) be of adequate strength to withstand normal shock loads.

Transport of Persons in Skip

7.5.8 Except when being used to transport workers for shaft inspection or maintenance purposes, a skip used to transport persons in a shaft shall

(1) comply with the requirements of section 7.5.6 (1) and (3),

(2) provide an enclosure for the persons being transported which is at least 1.5 m in height,

(3) have a suitable and adequately fastened floor,

(4) have a means for safe entry and exit, and

(5) be constructed so as to prevent any part of the body of a person riding in it, or any part of material being carried in it, from coming into contact with the shaft, its lining, or its furnishing.

Fall Protection

7.5.9 The opening between the side of a shaft and the skip box over which a person must pass when entering or leaving the skip shall be closed off sufficiently to prevent a person from falling through the opening.

Signal Pull Cord

7.5.10 The shaft signal pull cord shall be located in a convenient place for the skip tender when persons are being transported in the skip.

Safety Catches **7.5.11** The safety catches on a cage or skip shall

(1) be of a type and design approved by the chief inspector,

(2) safely stop and hold a cage or skip carrying persons if the hoisting rope or its attachment should fail,

(3) be subjected to, and successfully pass, free fall tests as prescribed in sections 7.5.12 and 7.5.13

(a) before the cage or skip is first used for the transport of persons, and

(b) before the cage or skip is used for the transport of persons after repairs to correct any defect or distortion of the safety catches and mechanisms.

Free Fall Tests **7.5.12** The free fall tests required by section 7.5.11 (3) shall be performed under the following conditions

(1) the cage or skip shall carry a weight equal to the maximum permitted load of persons carried and of any material permitted to be carried at the same time,

(2) the cage or skip shall travel at a speed equal to the normal hoisting speed when transporting persons, and

(3) the guides on which the test is made shall be representative of those in the shaft.

Free Fall Tests — Results **7.5.13** A free fall test shall be considered successful if

(1) the cage or skip is decelerated within 1 g and 3 g,

(2) there is no damage to the safety dogs or mechanisms,

(3) the safety dogs engage the guides continuously during deceleration, and

(4) calculations show that the safety dogs would stop the cage or skip when carrying its maximum permitted material load.

Free Fall Tests — Report **7.5.14** The results of a free fall test shall be submitted to the chief inspector on a Free Fall Test Form obtainable from an inspector, and entered in the Hoisting Machinery Record Book.

Chairs

7.5.15 (1) Chairs used for landing a cage shall be

(a) arranged to fall clear and remain clear of the shaft compartment when the cage is lifted off the chair,

(b) operable only from outside the cage, and

(c) so arranged as not to distort the cage.

(2) Chairs fastened to shaft station posts shall be of a chain type.

Work Platforms in Shafts

7.5.16 (1) Where a work platform that is not a shaft conveyance is used to transport or support a person, it shall be designed by a professional engineer and built in accordance with the design.

(2) The manager shall prepare a written procedure for the use of a work platform in a shaft and notify the chief inspector, in writing, of his intention to put it into service.

Hoists

Drum to Rope Ratio

7.6.1 (1) The ratio of a hoist drum diameter to the rope diameter shall be equal to or greater than

(a) in the case of a drum hoist, 60 to 1 where the nominal rope diameter is 26 mm (1") or less, and 80 to 1 where the nominal rope diameter is greater than 26 mm (1"),

(b) in the case of a hoist used for shaft sinking or for preliminary development work during shaft sinking, 48 to 1 where the nominal rope diameter is 26 mm (1") or less, and 60 to 1 where the nominal rope diameter is greater than 26 mm (1"), and

(c) in the case of a friction hoist, 80 to 1 for stranded ropes, and 100 to 1 for locked coil ropes.

(2) Subsection (1) (a) does not apply to a drum hoist installed and approved for use prior to the code coming into force.

Hoist Brakes Required

7.6.2 (1) No hoist shall be used for the transport of persons in a shaft unless it has at least two sets of mechanical brakes to stop and hold the drum from which persons are being hoisted or lowered.

(2) Each set of mechanical brakes shall

(a) be capable of safely stopping and holding the drum when the shaft conveyance is carrying its maximum permitted load,

(b) be arranged so that it can be independently tested,

(c) be arranged to apply normal braking effort before any linkage or brake piston reaches a limit of travel, and

(d) if of a drum type, be equipped with a device to give positive indication of tread wear or slack linkage, and prevent any movement of the hoist if predetermined limits are exceeded.

Brake Application

7.6.3 At least one set of mechanical brakes required by section 7.6.2 shall be designed and arranged to

(1) apply directly to the hoist drum, and

(2) apply automatically whenever the safety circuit of the hoist is interrupted and whenever the pressure in the hydraulic or pneumatic brake actuating system drops below normal.

Brake Control

7.6.4 The mechanical braking system of a hoist shall be arranged so that

(1) the brake is applied by a control lever that is pulled, unless there is a common brake and power lever,

(2) where brake weights are installed to provide braking force, they can be readily tested to ensure freedom of movement, and

(3) at least one set of hoist brakes is applied automatically if there is a loss of power to the hoist.

Hoist Drum Deceleration

7.6.5 (1) Subject to subsection (2), the brakes of a drum hoist shall be designed and arranged to decelerate the drum at between 1.5 and 3.7 m/s/s when braking is initiated by an interrupted safety circuit and the hoist is

(a) normally used for transporting persons, and

(b) operating in the normal full speed zone in the shaft.

(2) Subsection (1) does not apply to a drum hoist installed and approved for use prior to the code coming into force.

Brake Testing Required

7.6.6 (1) A drum hoist, normally used for the transport of persons, which was installed prior to the code coming into force shall have braking tests performed to determine its deceleration.

(2) Where the tests required by subsection (1) establish that the deceleration exceeds 5.5 m/s/s, the hoist shall be modified within one year of the code coming into force to reduce the deceleration to 5.5 m/s/s or less.

(3) The braking system of a hoist not normally used for the transport of persons shall be designed and arranged to safely stop and hold the shaft conveyance under all permitted conditions of loading and speed and in either direction of travel.

Foot-operated Brake

7.6.7 No hoist shall be equipped with a foot-operated brake.

Protective Circuit Required

7.6.8 No electric hoist shall be used unless it has a fail-safe, protective electrical circuit operating at a nominal potential not exceeding 250 V which, when interrupted, will cut off the power supply to the hoist to actuate the brake setting mechanism and bring the hoist safely to a stop under any condition of permissible load and speed.

Interruption of Safety Circuit

7.6.9 The safety circuit of an electric hoist shall be interrupted whenever

(1) there is a failure of the power supply or a drop in voltage sufficient to affect the safe operation of the hoist,

(2) there is an abnormal overload on the hoist motor,

(3) there is a short circuit in the hoist electrical system, or

(4) a prescribed safety device has operated.

Emergency Switch

7.6.10 An emergency stop switch, arranged to interrupt the safety circuit of an electric hoist, shall be located within easy reach of an operator controlling the hoist, and the switch shall be easily identified and readily operated by hand.

Track Limit Switch

7.6.11 A track limit switch shall be installed in each shaft hoisting compartment, above the normal upper limit of travel, and so arranged and positioned that in the event of an overwind it will be operated directly by the shaft conveyance or counterweight to interrupt the hoist safety circuit and bring the hoist to a safe stop before the conveyance, counterweight, or rope attachments can reach any permanent obstruction in the shaft or headframe.

Overspeed and Overtravel Protection

7.6.12 Every electric hoist shall be equipped with a device to protect the shaft conveyance or counterweight against

(1) overwinding and, except during shaft sinking operations, underwinding,

(2) approaching a limit of travel at an excessive speed, and

(3) travelling at speeds in excess of the normal safe operating speeds.

Operation of Safety Devices

7.6.13 The device required by section 7.6.12 shall

(1) interrupt the hoist safety circuit when activated,

(2) be driven directly by the hoist drum,

(3) be protected against loss of motion,

(4) prevent the paying out of excess rope during sinking operations, and

(5) be set to bring the hoist to a safe stop before the conveyance, counterweight, or rope attachments can reach any permanent obstruction in the shaft or headframe.

Friction Hoists — Safety Devices

7.6.14 In the case of a friction hoist, devices shall be installed that are set to interrupt the hoist safety circuit if

(1) abnormal slip occurs between the hoist drum and the hoist ropes,

(2) abnormal wear occurs on the rope treads or the permissible limit of tread wear has been reached,

(3) a device installed in the mine shaft detects a shaft conveyance or counterweight approaching the shaft collar at an excessive speed,

(4) an abnormal swinging or rising occurs in the loop of a balance rope at the bottom of the shaft.

Synchronization

7.6.15 A device shall be installed on each friction hoist to synchronize the position of the shaft conveyance with the safety devices driven from the hoist drum.

Electric Hoist — Requirement

7.6.16 Every electric hoist shall

(1) have an ammeter within plain view of the hoist operator to indicate the hoist motor current,

(2) except where automatic retardation controls are installed at the limits of travel, have a device to audibly warn the hoist operator when the shaft conveyance is at a point in the shaft where manual braking must be commenced,

(3) have a speed indicator if the normal rope speed exceeds 2.5 m/s; however, a hoist without a speed indicator in use prior to the enactment of the code, may continue to operate without one, but within 2 years of the code coming into force, every electric hoist with a normal rope speed greater than 2.5 m/s shall have a hoist speed indicator, and

(4) have a device which gives a voltage reading proportional to the speed of the hoist.

Electric Hoists — Safety Devices

7.6.17 Every electric hoist shall have

(1) a back-out device to enable a shaft conveyance or counterweight to be removed from an overwound or underwound position; the device shall only be capable of manual operation and it shall prevent the brakes from being released until sufficient torque has been developed to ensure movement in the right direction,

(2) underwind and overwind bypass devices arranged so that they are only capable of manual operation and will only allow the hoist to be operated at a slow speed, and

(3) overwind bypass devices arranged so that they will only allow travel beyond the first device providing overwind protection.

Electric Hoists — Controls

7.6.18 Every electric hoist shall have

(1) a master controller that has a neutral or brake reset position,

(2) the brake operating levers arranged so that, after any interruption of the hoist safety circuit, power cannot be restored to the hoist unless the brake levers are in the brake-applied position, and

(3) accurate and sensitive safety controllers.

Safety Devices — Design and Adjustment

7.6.19 Every safety and protective device installed at a hoisting installation shall

(1) be designed and installed taking into account the environmental conditions at its operating location, and

(2) only be adjusted and maintained by a qualified and authorized person.

Indicators

7.6.20 A hoist shall be provided with depth indicators that continuously, accurately, and clearly show the hoist operator the position

(1) of a shaft conveyance and counterweight, if any,

(2) in an inclined shaft, of a change in gradient that requires a reduction in hoist speed,

(3) at which the overwind, underwind, and track limit devices are set to operate,

(4) of any intermediate shaft obstruction,

(5) of the limits of normal travel for the shaft conveyance and counterweight, if any, and

(6) of any collar doors, dump doors, and crosshead landing chairs.

Use of Skip to Transport Persons

7.6.21 (1) When a skip is being used to carry persons, the hoist shall

(a) be equipped with control devices that prevent the skip from being taken to the dump position and to the skip loading pocket, unless the controls for loading the skip with ore or waste have been locked out in accordance with section 4.11.2, and

(b) not be permitted to travel in excess of one-half its normal speed and in no case shall the speed be permitted to exceed 5 m/s.

(2) The control devices of the hoist shall be designed and installed to fail to safety.

(3) An audible or visible signal that the control devices for the hoist are set in operation shall be given to persons entering a skip.

Drum Requirements

7.6.22 No drum hoist shall have

(1) more than 3 layers of rope where the drum has helical or spiral grooving or does not have grooving,

(2) more than 4 layers of rope if the drum has parallel and half pitch grooving, and

(3) less than 3 dead turns of rope remaining on the drum when the conveyance or counterweight is at its lowest possible position in the shaft.

Drum Grooves and Flanges

7.6.23 (1) A cylindrical drum on a hoist shall be provided with

(a) grooves that properly fit the rope in use, except that during shaft sinking operations and preliminary development work, a smooth drum may be used, and

(b) flanges of sufficient height to contain all of the rope on the drum and of sufficient strength to withstand any loads imposed by the rope.

(2) Any conical portion of a hoist drum shall be provided with grooves to prevent the rope from slipping on the drum.

7.6.24 A drum hoist and a sheave shall be arranged so that the rope coils properly across the face of the drum and winds smoothly from one layer to another without cutting into the rope layer beneath.

Brake/clutch Interlock

7.6.25 (1) A clutch of a drum hoist shall be interlocked with the brake so that

(a) the clutch can be disengaged only when the brake of the drum is fully applied, and

(b) the clutch is fully engaged before the drum can be released.

(2) The controls for engaging and disengaging a clutch shall be designed or equipped with guards to prevent their inadvertent operation.

(3) A band type friction clutch shall not be used.

Slack Rope Detection

7.6.26 Drum hoists shall be equipped with a device for detecting slack hoist rope.

Communications and Signalling

Cage Call System

7.7.1 Cage call systems shall be installed so that the signals are inaudible to the hoist operator and operate on not more than 150 V.

Hoist Signalling System

7.7.2 A signalling system shall be installed at every hoisting shaft to permit the person in charge of the shaft conveyance and the hoist operator to exchange hoist control signals.

Signalling System — Electrical Requirements

7.7.3 (1) The signalling system required by section 7.7.2 shall be supplied with power at a potential not exceeding 150 V from a transformer which does not supply any other equipment.

(2) If the primary voltage of the transformer exceeds 750 V

(a) one conductor of the power supply shall be grounded, or

(b) if the conductors are ungrounded, an isolating transformer with a one-to-one ratio shall supply power for the signalling system, and

(c) a device shall be installed to indicate a ground fault.

(3) All metal parts of the signalling system which do not carry electrical current shall be grounded unless located not less than 2.4 m above the floor.

Hoisting Signals

7.7.4 The shaft signalling system shall

(1) enable clear, audible signals to be given that are separate and distinct for each shaft compartment,

(2) be arranged so that the hoist operator can return a signal to the person giving the signal, and

(3) be installed throughout the shaft and at every working level, landing deck, and other necessary locations.

Multi-deck Stage Signals

7.7.5 A shaft signalling system installed on a multi-deck stage at a sinking operation shall be capable of providing a signal that is both audible and visible.

Radio Frequency Signals

7.7.6 A shaft signalling system using radio frequencies shall

(1) be tested to determine if there is any hazard to the use of blasting caps in the mine, and

(2) only be operated if precautions are taken to prevent the risk of an inadvertent or accidental detonation of any explosive material as a result of radiated energy.

Persons Authorized to Give Signals

7.7.7 (1) Only qualified persons authorized by the manager shall give any shaft signal other than the danger signal.

(2) Except during maintenance work, shaft sinking, or preliminary development work, or to recall a conveyance after a 5 bell release, no person shall give any shaft signal unless the shaft conveyance is located at the level from which the signal is being given.

(3) No person shall interfere in any way with the signalling arrangements.

Signalling System Operation

7.7.8 (1) A hoist shall not be moved on manual control unless

- (a) the signal prescribed in section 7.7.9 has been given and returned by the hoist operator,
- (b) at least 4 seconds have elapsed after the executive signal has been given, and
- (c) if the hoist operator is unable to act within 30 seconds of receiving the executive signal, until a complete signal has again been received.

(2) Shaft signals shall be given in the following sequence

- (a) cautionary,
- (b) destination, and
- (c) executive.

7.7.9 The prescribed code of signals set out in Appendix 7-1 of this part shall be used at every mine, and a copy of the signal code posted in every hoistroom, at the collar of the shaft, and at every working level or other landing in the shaft.

Special Signals

7.7.10(1) Special signals in addition to, and readily distinguishable from, those prescribed in section 7.7.9 shall

(a) be used to designate hoist movements without interfering in any way with the prescribed signals, and

(b) be approved by the district inspector.

(2) The special code of signals in use at a mine and an adequate description of their application shall be posted in the hoistroom, at the shaft collar, and at every working level of the shaft.

Voice Communications

7.7.11 A system for communicating by voice shall be installed and maintained to permit communication between persons at the collar of the shaft, the landing stations, and the hoistroom for the shaft.

Hoisting Procedures

Transport of Persons

7.8.1 Persons shall not be transported in a shaft conveyance that is simultaneously being used to transport ore, or other material, or when the cage doors are open.

Transport of Persons With Supplies

7.8.2 Where a multi-deck cage is in use, no persons shall be allowed to travel in the cage when it is loaded with supplies or rolling stock, except that persons may be carried on the top deck with the doors closed if

(1) the materials and rolling stock are loaded on another deck and adequately secured,

(2) the combined load does not exceed 85% of the material load limit of the cage, and

(3) the scheduled man-riding trips have been completed.

Transport of Persons With Personal Equipment

7.8.3 No persons shall be allowed to travel in a shaft conveyance when personal hand tools or equipment are being transported unless

(1) they are adequately secured and guarded where necessary,

(2) the combined load does not exceed 85% of the material load limit of the conveyance, and

(3) the tools and equipment are placed so that they do not cause danger or discomfort to persons in the conveyance.

Authorized Person in Charge of Conveyance

7.8.4 (1) Whenever persons are being transported in a shaft conveyance where the hoist is operated under manual control, there shall be a qualified and authorized person in charge of the conveyance at all times who shall

(a) maintain discipline whenever persons are riding in the shaft conveyance,

(b) enforce the specified load limits for the shaft conveyance, and

(c) notify the hoist operator if a heavy or an irregularly shaped load is being handled.

(2) Whenever persons are underground in a part of a mine served by a shaft hoist operated under manual control, the person in charge of the conveyance shall, when not riding in the conveyance, be available within sound of the shaft signals at all times.

Transport of Explosives and Rolling Stock

7.8.5 No person shall travel in a shaft conveyance that is carrying explosives, supplies, or rolling stock

(1) unless he is required to handle the material and there is adequate space for his safety, and

(2) the combined load does not exceed 85% of the material load limit of the conveyance.

Discipline

7.8.6 (1) When persons are being transported in a shaft conveyance they shall maintain appropriate conduct and the person in charge of the conveyance shall ensure that there is no improper conduct.

Notice Showing Conveyance Capacity

7.8.7 (1) A notice clearly showing the load restrictions for the weight of material and the number of persons to be carried in the shaft conveyance shall be posted at the shaft collar and all entrances to the shaft.

(2) The person qualified and authorized to give signals shall observe the notice.

(3) No person shall obstruct enforcement of the notice.

Transport of Material

7.8.8 When any material being transported in a shaft projects above the top of the shaft conveyance, the projecting portion shall be securely fastened to the shaft conveyance and not to the hoist rope.

Compartment Entry Prohibited

7.8.9 No person shall enter a hoisting compartment of a shaft in which hoisting operations are being carried on, except to enter or leave a shaft conveyance in that compartment.

Hoisting Suspended During Shaft Work

7.8.10 (1) Except during shaft sinking operations and concurrent preliminary development work, no hoisting operations shall be carried out simultaneously with any other work in a shaft compartment or in that part of the headframe used in conjunction with it.

(2) Where such work is to be done, the person in charge shall warn the hoist operator on duty and make a signed entry in the Hoistman's Logbook.

Shaft Examination

7.8.11 (1) No person shall work in a shaft or in that part of the headframe used in conjunction with it unless the person is adequately protected from accidental contact with a moving shaft conveyance and the danger of falling material or rock.

(2) No loading box shall be equipped with doors, gates, or chains which are closed by positive compressed air pressure, and which may open if the air supply fails and discharge rock into the shaft.

(3) No person shall work in a shaft compartment, or in a place immediately adjoining the compartment, or in that part of the headframe used in conjunction with it while hoisting operations are being carried on in the compartment, except where

(a) the shaft conveyance is necessary for carrying out the work, or

(b) the person is engaged in filling skips at a loading station and is properly protected in a location having adequate dimensions for safely carrying out his duties, or

(c) the work is being performed in a separate compartment that meets the requirement of section 7.1.5 (2).

Automated Hoisting

7.8.12 (1) Where a hoist is being operated by automatic or semi-automatic control and no other means are available for getting persons out of the mine quickly, a qualified hoist operator shall be readily available to operate the hoist whenever workers are underground.

(2) A device that permits changing from manual to automatic control shall be installed on an automatic hoist and the device shall be located where it is readily accessible to the manual controls, and operated only by an authorized person.

Automatic Hoisting — Location of Controls

7.8.13 (1) Where a hoist is designed to be operated automatically from controls located at shaft stations and inside the cage, the switch for effecting a changeover of the control made between the shaft station and the cage shall be effective only at the shaft station where the cage is stopped.

(2) Devices installed at shaft stations for selecting the cage destination and initiating hoist movement shall be effective only when the cage is stopped at that station.

(3) Except for jogging movements, a control located at a shaft station for initiating hoist movement shall be effective only when the shaft gate is closed.

(4) When an executive signal is given from a control at a shaft station, at least 5 seconds shall elapse before the hoist moves.

(5) Except for jogging movements, devices located inside a cage for initiating hoist movements shall be effective only when the doors of the cage and the shaft gates are closed.

(6) Where a control for initiating hoist movement is located inside a cage, a device shall be installed in the cage which can cause the hoist safety circuit to be interrupted in an emergency.

(7) If an emergency stop occurs during automatic or semi-automatic hoisting operations, an alarm shall sound and the hoist shall be operated manually until the reason for the emergency stop has been found and, if caused by a fault, until the fault has been corrected and the hoist operated for sufficient time to ensure that it is operating normally.

Brake Testing

7.8.14 After going on shift, and before raising or lowering a shaft conveyance, the hoist operator shall ensure that each drum brake is capable of holding its maximum permitted load by testing it against the normal, full load starting torque of the hoist. The drum shall not be unclutched until the test has been made.

Hoist Operator's Duties

7.8.15 In accordance with a procedure established by the manager, a hoist operator shall

(1) at the start of his shift, test the brakes to ensure that they are in a satisfactory working condition, and

(2) at least once in each 24-hour period of hoist operation, test the overwind and underwind protective devices by slowly raising or lowering the shaft conveyance or counterweight into them.

Hoisting Stoppages

7.8.16 A hoist operator shall make a return trip of the shaft conveyance

(1) through the working part of the shaft after any stoppage of hoisting for more than 2 hours, and

(2) below any part of a shaft that has been under repair, after the repairs have been completed.

Hoist Operator's Responsibilities

7.8.17 A hoist operator shall

(1) remain at the hoist controls at all times that the hoist is in motion under manual control,

(2) not talk with anyone while the hoist is in operation under his control, except in an emergency and during shaft maintenance and examination,

(3) not operate the hoist to transport any person unless at least two brakes can be applied to safely stop the conveyance,

(4) not lower persons on an unclutched drum, and

(5) whenever he leaves the hoist controls, except when the hoist is put on automatic control, set the brakes and the controls so that at least two separate and distinct actions are required to put the hoist in motion.

Signals to Hoist Operator

7.8.18 (1) A hoist operator shall complete any hoist movement required by an executive signal without stopping unless he receives a "stop" signal or an emergency occurs.

(2) After receiving a 3-bell signal, a hoist operator shall remain at the hoist controls unless advised orally by the person in charge of the conveyance that hoist movement will not be required.

Hoist Operator to Attend to Hoist Only

7.8.19 A hoist operator shall not be required to look after any other machinery except with the approval of the chief inspector.

Hoisting Prohibition

7.8.20 No person shall

(1) operate or interfere with any devices or controls for operating a hoist unless qualified and authorized,

(2) speak to the hoist operator while he is operating the hoist on manual control, except in an emergency or when the hoist is being repaired, maintained, or adjusted and a notice to this effect shall be posted in the hoistroom,

(3) be on a cage while it is being placed onto or removed from chairs,

(4) be in, on, or under a shaft conveyance or counterweight which is supported by an unclutched drum unless the conveyance or counterweight is secured in position or unless permitted by section 7.1.21 (1), or

(5) leave a shaft conveyance that has inadvertently stopped at a point other than a shaft station, except upon instruction from a qualified and authorized person outside the conveyance.

Chairing Cage

7.8.21 Chairs shall not be used for landing a cage unless

(1) a signal for chairing has been given and returned, or

(2) special arrangements have been made to operate a cage with a car, in balance, from that location.

Object Falling Down Shaft

7.8.22 The normal operation of a hoist shall be suspended if an object, which may be a hazard to the operation of a shaft conveyance or counterweight, has fallen down the shaft until,

(1) a shaft inspection and a trial run through the affected part of the shaft have been made,

(2) any obstructions have been removed, and

(3) any damage affecting safe operation has been repaired.

Hoisting Procedures

7.8.23 (1) The manager shall issue written procedures for the safe operation of the hoist and have them accepted by the chief inspector.

(2) Every hoist operator shall be instructed in these procedures which shall include

(a) operating the hoist where there is an intermediate shaft obstruction,

(b) emergency procedures,

(c) commencing hoisting operations after an inadvertent stoppage of the hoist, and

(d) the operation of any man safety devices.

Inadvertent Stoppage of Hoist

7.8.24 (1) The manager shall develop procedures for removing persons from a shaft conveyance that has inadvertently stopped at a place in the shaft other than a shaft station.

(2) The person designated to be in charge of a shaft conveyance by virtue of section 7.8.4, shall be readily available and trained to carry out these procedures.

Signal Required

7.8.25 No hoist operator shall move a shaft conveyance without receiving a proper signal unless the conveyance has been inadvertently stopped at a point in the shaft other than a station from which signals can be given, and he has received instructions from a qualified and authorized person.

Record Keeping

Hoist Operator's Logbook

7.9.1 A hoist operator shall, each shift, enter in the Hoistman's Logbook

(1) the working condition of the hoist brakes, clutches, clutch-brake interlocks, depth indicators, hoist controls, signalling systems, overwind and underwind devices, and any other devices that may affect the safe operation of the hoist,

(2) any instructions he received and any unusual circumstances that occurred affecting the normal operation of the hoist,

(3) the results of any tests or trial trips made in compliance with the code, and

(4) a report of any inadvertent stoppages that occurred.

Hoist Operator's Entries in Logbook

7.9.2 A hoist operator shall

(1) before commencing to operate the hoist, review and countersign all entries in the Hoistman's Logbook for the preceding two shifts,

(2) enter in the logbook the time at which he commenced and finished his shift, and

(3) sign all entries he makes during his shift.

Hoist Operator's Logbook — Supervisor's Entries

7.9.3 (1) Any person issuing instructions to a hoist operator shall record and sign such instructions in the Hoistman's Logbook.

(2) Each working day, the supervisor in charge of a hoist shall review and countersign all entries made in the Hoistman's Logbook during the preceding 24-hour work period.

(3) The Hoistman's Logbook shall be kept in the hoistroom and be available for inspection at all times.

Rope Certificate

7.9.4 No shaft rope shall be used unless it is accompanied by a certificate from the manufacturer giving the following information

(a) name and address of the manufacturer, coil or reel number, date of manufacture and type, length, and diameter of rope,

(b) weight per unit of length, number of strands, number of wires in each strand, class of core, diameter of wires, breaking stress of steel from which the wire is made, and the results of torsion tests of individual wires, and

(c) its breaking load as determined by actual tests at a testing laboratory acceptable to the chief inspector.

Record Book

7.9.5 The rope data required by section 7.9.4 along with the additional following information shall be entered in a book known as the Rope Record Book, and a copy shall be forwarded to the chief inspector and the district inspector when a shaft rope is first installed

(1) date of purchase, date installed, identification number, where used, name of shaft and compartment in which the rope is used, weight of shaft conveyance, maximum weight of material carried, weight of maximum length of rope in service, and static factor of safety.

History of Rope

7.9.6 (1) The Rope Record Book shall contain a history of each shaft rope including

(a) the date it was installed, shortened and removed,

(b) dates and summaries of destructive and non-destructive tests, and

(c) certification of trial trips and examinations.

(2) The Rope Record Book shall always be available for inspection.

(3) When a shaft rope is taken out of service, notice to that effect shall be forwarded to the chief inspector and the district inspector giving the date and reasons for discarding.

Non-destructive Tests: Hoisting Equipment

7.9.7 Without limiting section 7.4.6, every part of a hoist and hoisting equipment the failure of which could endanger persons, shall be subjected to an annual non-destructive test conducted by a certified person, and a copy of the test results shall be forwarded to the chief inspector.

Qualified Person to Be Appointed

7.9.8 The manager shall appoint a qualified person, or persons, to carry out the inspections prescribed in sections 7.9.9, 7.9.10, 7.9.11, 7.9.12 and 7.9.13 of the code.

Daily Inspection

7.9.9 At least once in each normal production day, an inspection shall be carried out of

(1) the exterior of each hoisting rope and tail rope to detect the presence of kinks or other visible defects and to note the condition of the rope dressing, and

(2) the cage safety catches for any visible damage or defects.

Weekly Inspection

7.9.10 At least once in each week, an inspection shall be carried out of

(1) all shaft conveyance safety mechanisms for proper adjustment, freedom of movement, and freedom from damage,

(2) all head, deflection and idler sheaves, and shafts and their bearer and sole plates,

(3) all rope attachments, shaft conveyance and counterweight attachments, and suspension gear,

(4) any shaft conveyance counterweight and work platform,

(5) all parts of the hoist that could affect its normal operation including the brakes, clutches, interlocks, depth indicators, and all safety devices,

(6) any hoisting equipment being used during shaft sinking operations, and

(7) any auxiliary brake operating weights to ensure that they move freely and have adequate holding capacity.

Monthly Inspection

7.9.11 At least once each month, an inspection shall be carried out of

(1) the shaft ropes to determine the amount of wear, distortion and corrosion, the need for lubrication, and the need for changing any wear patterns,

(2) the hoisting ropes to determine the number of broken wires, and

(3) the friction treads on a friction hoist.

Six-monthly Inspection

7.9.12 At least once in every 6 months of service, an inspection shall be carried out of

(1) the hoisting rope on a drum hoist within the attachments at the drum and at the drum spout, and

(2) the hoisting rope of a friction hoist within the attachments at the shaft conveyance and counterweight in accordance with a procedure established by the manager.

Annual Inspection

7.9.13 At least once in every 12 months, an inspection shall be carried out of,

(1) foundation bolts, bolt locking devices, and all other bolts and fastenings that are critical for hoist safety, and

(2) the bails, suspension gear and structural components of every shaft conveyance and counterweight.

Testing Safety Catches

7.9.14 (1) A qualified and authorized person shall, at least once in every month, test the safety catches on a shaft conveyance by suddenly releasing the empty conveyance from rest so that the safety dogs have the opportunity to grip the shaft guides and hold the conveyance.

(2) At least once in each year, and at other times as required by the mechanical inspector, the safety catches shall be subjected to a quick release test with the conveyance carrying a load equivalent to the maximum allowable load for that conveyance.

(3) If the safety catches do not operate satisfactorily, the shaft conveyance shall not be used for the transport of persons until the necessary repairs have been made and the safety catches re-tested and found to be satisfactory.

Hoist Rope Maintenance

7.9.15 (1) Hoisting ropes in use on a drum hoist shall be cleaned when necessary and be dressed with lubricant at least once each month so as to maintain a good coating.

(2) The supervisor in charge of the work shall enter the date and sign a record of the rope cleaning and dressing in the Hoisting Machinery Record Book.

Special Requirements for Ends of Rope

7.9.16 (1) After every six months of service on a drum hoist, the portion of the hoisting rope that passes through the clamps at its attachment to the shaft conveyance or counterweight shall be cut off.

(2) After every eighteen months of service on a friction hoist, the portion of a hoisting rope or tail rope that is within a wedge and socket attachment shall be cut off unless that portion of the rope is visually examined by a qualified and authorized person and found not to have

(a) any broken wires, significant corrosion, or serious pitting, and

(b) any excessive deformation of the wires.

Hoisting Machinery Record Book

7.9.17 A record of all inspections and examinations carried out in compliance with Part 7 of the code on the hoisting equipment, and a record of all repairs and maintenance work done, shall be entered in the Hoisting Machinery Record Book and all entries shall be dated and signed by the person who performed the work.

Record of Mechanical Failures and Accidents

7.9.18 (1) A record of any failure or accident involving a mechanical part of a hoist installation shall be made in the Hoisting Machinery Record Book by the supervisor responsible for the mechanical parts of the hoisting plant.

(2) The supervisor responsible for the mechanical parts of the hoisting plant shall countersign each entry made in the Hoisting Machinery Record Book with respect to all examinations and inspections carried out in compliance with Part 7 of the code.

Electrical Inspections

7.9.19 (1) A qualified and authorized person or persons shall be appointed by the manager to examine, inspect, and test the electrical parts of an electrically powered or controlled hoist.

(2) The person or persons appointed shall, at least once each week, make an examination of the hoist motors, the hoist controls, the electrical safety devices, and the signalling system.

(3) A record of the examinations and of all repair and maintenance work carried out shall be made in the Electrical Hoisting Equipment Record Book.

(4) All entries in the Electrical Hoisting Equipment Record Book shall be dated and signed by the person performing the work.

Record of Electrical Failures and Accidents

7.9.20 A record of any failure or accident involving an electrical component of a hoist motor, a hoist control, an electric safety device, or the signalling system shall be made in the Electrical Hoisting Equipment Record Book by the supervisor in charge of the electrical parts of the hoisting equipment.

Hoisting Plant Supervisor's Responsibilities

7.9.21 The supervisor in charge of all of the hoisting plant and equipment shall

(1) at least once each week, review the entries made in the Hoisting Machinery Record Book and the Electrical Hoisting Equipment Record Book during the preceding week,

(2) ensure that all examinations and tests, required by Part 7 of the code, have been carried out and any necessary repairs or adjustments made, and

(3) upon completion of his review, certify in each record book that he has complied with subsections (1) and (2).

Reporting Defects to Manager

7.9.22 (1) If, during any examination or test required to be carried out by Part 7 of the code a weakness or defect is discovered which could endanger the safety of any person, the matter shall be reported immediately to the manager and the hoisting equipment shall not be used until the necessary remedial action has been taken.

(2) If any examination or test reveals an unusual condition of a shaft rope, although not constituting sufficient reason for condemning the rope, the chief inspector shall be notified immediately, and frequent examinations of the rope shall be made until an inspector has examined it.

Shaft Inspection

7.9.23 A qualified and authorized person shall carry out an examination

(1) at least once every week, of each mine shaft,

(2) at least once every month, of the shaft guides, timbers, walls, and compartments used for hoisting,

(3) at least once every year, of the headframe, headframe foundations and back legs, sheave decks, dumps, bins, and bin supports,

(4) of the shaft sump at such frequency as is necessary to ensure that the tail, guide, and rubbing rope connections are clear of water and spillage, and

(5) at least once every year, of the water in the shaft sump to determine the pH value.

Record of Shaft Inspection

7.9.24 A record of the examinations required by section 7.9.23, and a record of all maintenance and repair work performed shall be entered in the Shaft Inspection Record Book and all entries shall be dated and signed by the person who carried out the work.

Supervisor of Shaft and Headframe Responsibilities

7.9.25 The supervisor in charge of the mine shaft and headframe shall

(1) at least once each week, review the entries made in the Shaft Inspection Record Book during the preceding week,

(2) ensure that all examinations and tests required by Part 7 of the code have been carried out and any necessary repairs or adjustments made, and

(3) upon completion of his review, certify in the Shaft Inspection Record Book that he has complied with subsections (1) and (2).

Appendix 7-1

Mine Shaft Signal Code

1 bell — Stop Immediately — if in Motion

1 bell — Hoist

2 bells — Lower

3 bells — Persons About to Enter or Leave conveyance

(1) The 3-bell signal shall be given before persons are permitted to enter or leave the shaft conveyance.

(2) Where a return bell signal system is installed, the hoist operator shall return the 3-bell signal before persons are permitted to enter or leave the shaft conveyance.

(3) A hoist operator who has received a 3-bell signal shall remain at the hoist controls until receipt of the signal designating the movement required and completion of the movement.

4 bells — Blasting Signal

(1) The hoist operator shall answer a 4-bell signal by raising the shaft conveyance a few feet and then lowering it slowly.

(2) Following a 4-bell signal, only a one bell signal shall be required to signal for raising workers away from a blast.

(3) The hoist operator shall remain at the controls until the act of raising has been completed.

5 Bell — Release Signal

The hoist operator on receiving a 5-bell signal may move the shaft conveyance to another point in the shaft, not a recognized stopping point, and stop it there at his own discretion, but the person giving the release signal shall remain to guard the conveyance until it is moved.

9 Bell — Danger Signal

This signal shall be given only in case of fire or other danger, and followed by the signal for the level at which the fire or other danger exists.

1 bell followed by 2 bells — Chairing

3 bells followed by 3 bells followed by 1 bell — Hoist Slowly

3 bells followed by 3 bells followed by 2 bells — Lower Slowly

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Definitions

"*blaster*" means a person who is qualified under this part of the code to conduct blasting operations at a mine.

"*blasting agent*" means a relatively insensitive, ammonium nitrate explosive which includes any AN/FO mixture, emulsion, slurry, or watergel.

"*blasting certificate*" means a certificate issued under this part of the code which authorizes a person to conduct blasting operations at mines.

"*blasting machine*" means a portable device used to initiate a blast by electricity.

"*bootleg*" means a remnant of a blasthole that did not properly break when the blast was initiated.

"*collar*" in this part, means the start of a drilled blast hole.

"*detonator*" means a blasting cap, or other device used to initiate detonation of an explosive.

"*detonator house*" means a magazine used to store detonators.

"*explosive*" means any chemical compound or mixture which, when detonated, violently decomposes producing a large volume of gas at high temperatures capable of having destructive effects.

"*leg wires*" means the wires attached to an electric blasting cap used for initiating its detonation.

"*magazine*" means a building, storehouse, or structure where explosive materials are kept or stored but does not include containers used for transporting explosives or day storage boxes.

"*non-electric cap*" means a detonator which does not require an electric current to initiate its explosive charge.

"*primed cartridge*" means an explosive containing a detonator.

"*provisional blasting certificate*" means a blasting certificate issued by the manager, valid for a maximum of 90 days.

"*round*" means a number of charged blast holes to be fired in a specific sequence.

"*safety fuse assembly*" means a device to convey flame to a non-electric blasting cap. It consists of a train of black powder, tightly wrapped and enclosed with waterproof material, which burns continuously at a constant rate when ignited by means of an attached igniter cord connector.

"*socket*" means a short stub of a drill hole commonly found after a hole has been blasted.

Magazines

Permit Required

8.1.1 The manager shall

(1) apply for and receive an Explosives Storage and Use Permit from the district inspector before a magazine is located, erected, built, put into service, or modified, or before carrying out any maintenance work including the installation of lighting or heating,

(2) ensure that the magazine meets the regulations and standards of the *Explosives Act* (Canada).

Magazine Location

8.1.2 (1) The manager shall select the site for a magazine in accordance with the Table of Distances shown in Appendix 8.1 of this part.

(2) Notwithstanding subsection (1), the manager may apply to the district inspector for a variance where it is not possible to comply with the Table of Distances.

(3) The manager shall cease to use the magazine for the storage of explosives if the site conditions under which the Explosive Storage and Use Permit was issued are no longer valid.

Electrical Specifications

8.1.3 In every magazine

(1) electrical equipment and wiring shall meet the requirements of CSA Standard, CAN3-M421-M85 "Use of Electricity in Mines",

(2) all wiring shall be installed in metal armour, or rigid metal conduit having screwed, waterproof joints,

(3) cable armouring and conduit shall be permanently grounded.

Heating and Lighting

8.1.4 Where a magazine is electrically heated or lighted, or provided with a connected telephone

(1) all electrical fuses shall be installed in a locked fireproof cabinet outside the room in which explosives are kept or stored,

(2) fuse or circuit breakers for heating circuits shall interrupt the current at 25% over the normal load,

(3) where a liquid is used as a heating medium, the radiation pipes shall be effectively grounded,

(4) fuses for lighting circuits shall not be rated at more than 10 A,

(5) lighting fixtures shall be suitable for Class II, Division 2 locations.

Overhead Power Lines

8.1.5 (1) Overhead power lines supplying electricity to a magazine shall be protected against power surges and lightning.

(2) The minimum horizontal distance between an overhead power line and a magazine shall be greater than the distance between adjacent power line supports.

Flammable Material

8.1.6 Gasoline, oil, or other flammable material shall not be stored in a magazine, or nearer to a magazine than the distance required by the Table of Distances in Appendix 8.1 of the code.

Magazine Signs

8.1.7 In areas where hunting or discharging of firearms may occur, suitable warning signs should be positioned so that any bullets aimed at them will not hit the magazine.

Magazine Rules

8.1.8 Every magazine shall be operated and maintained in accordance with the following rules

(1) it shall be in the charge of an authorized person who shall carry out a weekly inspection of the magazine,

(2) if on the surface of a mine, it shall be kept locked at all times except when explosives are being moved,

(3) it shall have an up to date inventory of its contents in a special logbook and all entries shall be signed by the authorized person in charge,

(4) it shall be kept clean, dry, and free from grit at all times and any spillage shall be cleaned up immediately,

(5) it shall be kept free of broken explosives packages or spilled explosives, and when necessary, the shelves and floors shall be treated with a suitable neutralizing agent to remove all traces of explosive substances,

(6) it shall have its contents arranged in a tidy and organized manner, including any explosives returned from a workplace,

(7) it shall not contain any exposed iron or steel except in fixtures.

Posting Rules

8.1.9 A copy of the rules for magazine operation and maintenance, required by section 8.1.8, shall be posted inside every magazine.

Storage of Detonators

8.1.10 (1) Detonators shall be stored in a special, separate building designated as a "Detonator House", to which the rules for magazines required by section 8.1.8 shall apply.

(2) Detonators shall not be kept or stored with explosives or taken into any magazine containing explosives.

(3) In an underground mine and with the permission of the district inspector, capped fuses and detonators may be kept or stored in suitable, closed containers which shall not be placed closer than 10 m to any explosives except during transport or when priming.

Fire Protection

8.1.11 The manager shall ensure that suitable signs are posted in appropriate places prohibiting open-flame lights ***or any ignition sources including smoking within 10 m of any magazine***.

No Smoking

8.1.12 No person shall smoke while handling, transporting or using explosives.

Stock Rotation

8.1.13 At every magazine the person in charge shall ensure that the stock of explosives is rotated so that for each type and size of explosive the oldest stock is used first.

Underground Exlosive Storage

8.1.14 In an underground mine, other than a coal mine

(1) a magazine for the storage of more than a 24 hour supply of explosives may be established with the written approval of the district inspector, and

(2) explosive storage boxes, holding not more than a 24 hour supply, may be maintained in each working place without the permission of the district inspector. The boxes shall be painted ***yellow*** and clearly marked "Explosives".

Blasting Certificates

Blasting Certificate Required

8.2.1 (1) No person shall conduct, or be permitted to conduct, a blasting operation unless he holds a valid provisional or permanent blasting certificate granted under this part of the code.

Uncertified Persons

(2) No person shall be granted a provisional or permanent blasting certificate unless he is able to give and receive orders in the English language.

Assistance for Blaster

8.2.2 A person who does not hold a blasting certificate shall not prepare a blast, but a certificated blaster may be assisted by a reliable person not holding a blasting certificate. The blaster shall ensure that the person assisting him remains under his supervision.

Provisional Blasting Certificates

8.2.3 A provisional blasting certificate, valid for a period not exceeding 90 days, may be granted by the manager, and a copy of the certificate shall be sent to the district inspector.

Blasting Certificate Examination

8.2.4 An applicant for a permanent blasting certificate shall pass a written examination, and satisfy the inspector that he is qualified to perform the duties of a blaster.

Certificate Restrictions

8.2.5 (1) A blasting certificate may contain any restriction deemed necessary by the inspector.

(2) The blaster shall deliver his certificate to the manager when he commences employment at the mine and the manager shall return it to the blaster when his employment is terminated, unless the certificate has been suspended under section 8.2.6 or 8.2.7.

Blasting Certificate Suspension by Manager

8.2.6 The manager shall suspend a person from working with explosives if, in his opinion, the person fails to comply with any section of the code related to blasting, commits a careless act with explosives or detonators, or is unfit to perform his duties as a blaster, and the manager shall notify the district inspector of the suspension without delay.

Blasting Certificate Suspension by Inspector

8.2.7 An inspector may suspend or cancel a blasting certificate if, in his opinion, the holder fails to comply with any section of the code related to blasting, commits a careless act with explosives or detonators, or is unfit to perform his duties.

Use, Care and Handling of Explosives

Acceptable Explosives

8.3.1 Only explosives that are acceptable to the chief inspector shall be used.

Identification of Explosives

8.3.2 Explosives shall have plainly marked or printed on every original package

(1) the name and place of business of the manufacturer and the date of its manufacture,

(2) the type and strength of the explosive, and the dimensions of the cartridge, and

(3) the UN classification number and the dangerous goods classification.

Opening Containers

8.3.3 Only implements made of non-sparking material shall be used to open cases containing nitro-glycerine based explosives.

Defective Explosives

8.3.4 Any explosives believed to be defective shall

(1) if in a workplace, be immediately removed,

(2) be reported to the manager and the district inspector, and

(3) if directed by the district inspector, be destroyed in a safe manner in accordance with the manufacturer's recommendations.

Safety Fuse Assemblies

8.3.5 Fuse shall only be used in blasting operations when it is made up into safety fuse assemblies, each of which shall

(1) have a detonator attached to it,

(2) be of a standard uniform length, identified by having the uncapped end painted a distinctive colour.

Frozen Explosives

8.3.6 Frozen explosives shall not be detonated and shall only be thawed with the permission of the district inspector and under any conditions he specifies.

Blasting Heated Rock

8.3.7 Where the temperature of the rock or material to be blasted exceeds 65 degrees Celsius, special procedures and precautions approved by the chief inspector shall be followed, and the OHSC shall be informed of these procedures and precautions.

Transporting Explosives

8.3.8 Explosives and detonators

(1) shall be carried or transported in the manner prescribed in this code, and

(2) if not used, shall be returned to the magazine or storage box, and shall not be hidden in or about the mine.

Careless Acts

8.3.9 (1) No person shall

(a) commit a careless act with explosives or detonators, or

(b) having discovered that such an act has been committed, neglect or omit to report immediately the incident to the shiftboss, who shall report the matter forthwith to the manager.

(2) The manager shall report the offence, without delay, to the district inspector and to the co-chairman of the OHSC.

Blasters Medical Surveillance

8.3.10 Blasters that are continually handling nitro-glycerin based explosives shall have a medical examination on a frequency of less than 3 year intervals to determine sensitivity to and any harmful health effects from the continued exposure to nitro-glycerine.

Transportation of Explosives

Supervision by a Competent Person

8.4.1 (1) Only a person authorized by the manager, shall remove explosives from a magazine and transport them to a workplace, and such a transfer shall be made without undue delay.

(2) No person shall smoke or have open-flame lights within 10 m of a vehicle transporting explosives.

Vehicle Requirements

8.4.2 A vehicle used to transport explosives shall

(1) have a separate compartment for the explosives which prevents them from coming into contact with any metal that could produce a spark,

(2) be constructed so that the explosives cannot fall from the vehicle,

(3) when carrying explosives, be provided with orange diamond-shaped placards *and* with clearly visible signs marked "Explosives" in letters not less than 150 mm in height,

(4) not be refuelled when carrying explosives, except in an emergency,

(5) have its engine shut off while loading or unloading explosives except where the vehicle uses an engine-powered device for loading and unloading the explosives,

(6) only be operated by an authorized person, and

(7) be equipped with suitable fire extinguishing equipment.

Transport of Detonator

8.4.3 A vehicle used to transport explosive material at a surface mine shall only carry detonators when they are packed in their original containers and placed in a wooden box with all its sides not less than 150 mm thick.

Transport by Locomotive

8.4.4 When explosives or detonators are being transported by means of a locomotive they shall

(1) not be carried on the locomotive, and

(2) be protected from any trolley wires, batteries or other hazards.

Transport in Shaft Conveyance

8.4.5 The person in charge of moving explosives or detonators to a headframe for transporting underground shall, immediately before doing so, notify the hoist operator, the deckman, and the cage tender.

8.4.6 Explosives shall not be transported in a shaft conveyance with other materials or with persons unless authorized by the manager.

Separate Containers

8.4.7 Explosives and detonators shall be transported in separate containers which are acceptable to the district inspector.

Loading and Priming

Care in Loading

8.5.1 Explosive shall not be loaded into a hole

(1) of insufficient size,

(2) by hitting, pounding, ramming, or applying undue pressure, or

(3) except by means of a loading tool made of wood, plastic, or other material approved by the inspector.

Cartridge Wrapper

8.5.2 Cartridge explosives shall not be removed from their wrappers except for water-gel or emulsion explosives that are to be used for blasting oversize rock or bringing down hung-up material.

Priming Nitro-glycerine Explosives

8.5.3 Primers shall be made up only as required and, when priming with nitro-glycerine type explosives, only a non-sparking implement shall be used to punch a hole in the explosive.

Priming Detonating Devices

8.5.4 Every primed charge shall

(1) contain a properly prepared detonating device sufficient to initiate the explosion reliably,

(2) have the detonator inserted into the cartridge in such a manner that it cannot be separated or pulled out of the cartridge during the loading operation, and

(3) be fired electrically or by approved non-electric means acceptable to the district inspector.

Carrying Capped Fuses

8.5.5 A person may carry capped fuses with explosives from the nearest storage place to a point of use, without placing them in a container, provided that they are kept separate from each other. In no case, however, shall primed cartridges be transported.

Tools

8.5.6 The use of any tool which could cause a spark shall not be used in any loaded blasthole.

Pneumatic Loading

8.5.7 Pneumatic loading of explosives into blastholes shall only be carried out

(1) with explosives of a type acceptable to the chief inspector, and

(2) where the procedures and equipment used will prevent any dangerous build-up of static electricity or hazards from stray electric currents.

8.5.8 The written approval of the chief inspector shall be obtained before any pneumatic loading of explosives is carried out over the leg wires of detonators.

Extraction of Explosives

8.5.9 No person shall extract, or attempt to extract, explosives of the nitro-glycerine type from a loaded blasthole.

8.5.10 Explosives of the ammonium nitrate type may only be removed from a blasthole by washing.

8.5.11 Insensitive water-gel or emulsion type explosives may be cautiously blown out of a blasthole by an authorized person using moderate air pressure and a blowpipe made of non-sparking material.

Vehicles Prohibited

8.5.12 A blast area shall be clearly identified by posted signs to prevent the inadvertent access of vehicles.

8.5.13 No equipment shall be allowed within 8 m of any charged blasthole except

(1) licensed explosives vehicles,

(2) explosive vehicles which have the exhaust directed above the cab of the vehicle,

(3) other equipment authorized in writing by the chief inspector.

Firing Explosives

Time for Blasting

8.6.1 The time for blasting shall be set so as to protect persons from exposure to dust, fumes, and smoke.

Guarding

8.6.2 Before blasting, the blaster, or person designated responsible for blasting, shall

(1) clear the blast danger zone of all persons,

(2) ensure that all entrances to the blast danger zone are guarded to prevent access, and not rely only on signs for the purpose, and

(3) when blasting on the surface of a mine, ensure that an effective audible warning is given in every direction.

Firing Procedure

8.6.3 *(1)* Every charged hole shall be fired in its proper sequence, and where any blast could affect other charged blastholes, all of the holes shall be fired in one operation.

(2) When required by the inspector of mines, a waterspray shall be used during blasting of development headings.

Waiting Time

8.6.4 A blaster shall allow sufficient time between blasts in an underground mine for

(1) the heading, or other workplace, to be cleared of fumes, and

(2) the broken rock to cool sufficiently so that there is no danger when it is being loaded.

Reporting Misfires

8.6.5 A blaster shall

(1) when possible, count the number of shots exploding,

(2) report to the shiftboss if he believes that any shot did not fire, and

(3) identify any misfired hole by inserting a conspicuous, non-metal marker at its outer end, or by roping the area off or by any other manner approved by the shiftboss.

Misfires

8.6.6 In the event of a misfired shot, the shiftboss shall

(1) determine the location, direction and depth of any hole necessary for blasting the misfired shot, supervise its drilling, and

(2) record in the daily examination and report book, the location of any misfired shot remaining at the end of the shift.

Raising and Sinking

8.6.7 Blasts shall be fired from a remote location during sinking operations, and when raising has exceeded 10 m or when required by the district inspector.

Safety Fuse

8.6.8 In any blasting operation, the safety fuse shall

(1) be at least 1 m in length, except if ignited electrically,

(2) be lit with a suitably timed igniting device and if more than one such device is used, they shall be activated simultaneously, and

(3) have a burning time at least twice that of the igniting device required by subsection (2).

Igniter Cord

8.6.9 The blaster, and any other person, shall immediately leave the workplace once igniter cord or fuses have been lit.

Blasting Machines

8.6.10 (1) A blasting machine shall be of a type approved by the chief inspector for a specific application, and it shall be kept in a cool, dry, storage place and maintained in serviceable condition.

(2) The power output of every blasting machine shall be tested by an authorized person, in the manner prescribed by the manufacturer, at least once each month, and immediately before being returned to use after having been taken out of service.

(3) The results of the tests carried out in compliance with subsection (2), shall be entered in a logbook, dated, and signed by the authorized person who made the tests.

Condenser Discharge Machines

8.6.11 Condenser discharge machines shall be examined to ensure that any residual charge remaining on the capacitors after use is discharged in accordance with the manufacturer's instructions.

Connection to the Blast Circuit

8.6.12 (1) A blasting machine shall not be connected to the blasting cables until immediately before firing the charges.

(2) A blasting machine shall be immediately disconnected from the blasting cables after firing or attempting to fire the charges.

Blasting From Power Lines

8.6.13 (1) Electric power from lighting or power circuits shall not be used for firing charges unless

(a) the blasting circuit has an isolating transformer, and

(b) a special firing device that opens the blasting circuit by gravity is used.

(2) The blasting circuit conductors between the firing device and the blast site shall be No. 12 AWG, or better, and readily identifiable as blasting cable.

(3) Where expendable connecting wire is used, it shall not be less than No. 20 AWG.

Blasting Switches

8.6.14 Every electric power line blasting switch shall

(1) have the live side of the device installed in a box which is fixed, locked, and accessible only to the blaster, and

(2) incorporate a lightning gap of at least 1.5 m between the blasting switch and the service switch. This gap shall only be closed by a twist-type plug and cord assembly immediately before firing.

Branch Circuits

8.6.15 Where a blasting circuit is used for more than one working place, each branch circuit shall be isolated by means of a locked isolating switch that automatically short circuits the branch circuit.

Circuit Testing

8.6.16 Where more than one shot is fired electrically, the blaster shall test the electrical circuit with an approved circuit testing device immediately before blasting.

8.6.17 Where a power line source is used only to initiate a non-electric blast, the district inspector may approve an isolating system other than that required by section 8.6.13.

Electric Storms

8.6.18 The manager shall ensure that persons engaged in blasting operations underground are warned of an electric storm.

8.6.19 A blaster shall not connect an electric blasting circuit during an electrical storm. Once an electric blasting circuit is connected, and should an electric storm occur, all persons shall be withdrawn to a safe distance from the blast site. Access to the blast site shall be guarded until the storm has passed.

Radio Transmitters

8.6.20 The blaster shall ensure that signs are posted to ensure mobile radio transmitters shall be turned off when within 20 m of a site where an electric blasting system has been connected.

Blasting Cables Near Electrical Conductors

8.6.21 Blasting circuit conductors shall be kept at least 150 mm away from power and lighting cables and from any other electrical conductors.

Blasting Lead Wires

8.6.22 All blasting circuit conductors leading to a blasting site shall be insulated and, except when firing the blast, shall be short circuited.

Return to the Work Area

8.6.23 When blasting by electricity, the blaster shall not enter, or allow any other person to enter the area until

(1) the firing cables have been disconnected from the firing device and short circuited, or

(2) in the case of a blasting operation using a power or lighting circuit, the switches of the blasting circuit have been locked in the open position.

Firing in Multiple Work Places

8.6.24 Blasting cables or wires that have been used for blasting in one workplace, shall not be used for blasting in another workplace until all proper precautions have been taken to ensure that the blasting cables or wires have no electrical connection with the leads from the first workplace.

Central Blasting

8.6.25 A written summary of the procedure to be followed and a layout of the system shall be submitted to the district inspector for his approval before a central blasting system is used or modified.

Drilling Near Explosives

Misfired Holes and Bootlegs — Drilling Precautions

8.7.1 Drilling shall not be carried out

(1) within 300 mm of a bootleg on the surface or within 150 mm underground, or

(2) where any part of the hole to be drilled could come within 5 m of a hole containing explosives unless it is drilled under the direct supervision of a shiftboss to clear a blocked hole, or to place an additional hole for blasting a misfired charge in accordance with section 8.6.6 (1).

8.7.2 Notwithstanding section 8.7.1, drilling may be carried out within 300 mm of a bootleg or a hole containing explosives on the surface or within 150 mm underground, where a written procedure has been authorized by the district inspector.

Drilling in Loose Rock

8.7.3 No person shall drill in a loose rock produced by blasting unless

(1) the rock has been thoroughly examined to ensure that it does not have any holes containing explosives, or

(2) an engineered offset pattern is utilized to prevent overlaying of holes, and

(3) if a hole containing explosives is discovered, the drilling shall be carried out in accordance with section 8.6.6 (1).

8.7.4 Where it is impracticable to make the examination required by section 8.7.3 (1), or use an offset pattern as per 8.7.3 (2), a remotely controlled drilling procedure shall be employed.

Misfires

Surface Misfires

8.8.1 (1) A misfired hole on the surface shall be clearly marked off for a distance of 8 m around the collar of the hole.

(2) The use of equipment shall be restricted within this 8 m distance except as provided in section 8.7.1, or under a procedure approved by the district inspector.

Time to Return

8.8.2 No person shall return or be allowed to return to the scene of a blast until the following times have elapsed

(1) when a blast is initiated with safety fuse assemblies, after a number of minutes equal to 7 times the number of metres in the longest fuse used,

(2) when safety fuse is involved and a misfire occurs, or is suspected, and after a reblast, a minimum of 30 minutes, and

(3) when no safety fuse is involved and a misfire is suspected, or when two or more detonators are used and the blaster cannot visually establish that all shots have fired, a minimum of 10 minutes from the time the blasting cable was disconnected and short circuited.

Inspection Before Abandoning

8.8.3 The shiftboss shall ensure that an underground development heading is not abandoned, or work discontinued, until material broken in the last round has been cleared from the face of the heading and the face has been examined for holes or sockets containing explosives.

Removal and Disposal

Removal of Explosives

8.9.1 No person shall take away or attempt to take away explosives, detonators, or fuse from a mine except as provided for in sections 8.9.2 and 8.9.3.

8.9.2 Explosives shall be removed or destroyed prior to the closure of a mine.

8.9.3 Section 8.9.1 does not apply

(1) to an explosive plant at a mine, operated under a licence issued by the Explosives Branch, E.M.R. (Canada), or

(2) if explosives are being returned to a registered explosives vendor, or

(3) if explosives are taken from the mine for a purpose authorized by the district inspector.

Adjacent Workings

Blasting at Adjacent Mines

8.10.1 Where parties are working on adjacent surface mines or underground mines having connected workings, they shall agree to a mutually acceptable blasting time and procedure.

Connection to Existing Workings

8.10.2 When an active heading is within 8 m of another mine opening or drill hole, the shiftboss shall before any round is fired

(1) make a thorough examination of the other mine opening, drill hole collar or the nearest point of intersection,

(2) satisfy himself that the heading can be advanced in a safe manner, and

(3) ensure that any access to the nearest point of intersection with the other opening or drill hole is guarded.

Underground Coal Mines

Permitted Explosives

8.11.1 Only explosives classed as "Permitted Explosives" by a laboratory acceptable to the chief inspector, shall be taken or used, underground in a coal mine.

Mines Subject to Outbursts

8.11.2 Explosives shall not be used in any part of an underground coal mine liable to outbursts of flammable gas without the written permission of the district inspector.

Non-combustible Stemming

8.11.3 In an underground coal mine, all charged shot holes shall be stemmed with a suitable non-combustible material before they are fired.

Taking Explosives Underground

8.11.4 In an underground coal mine, explosives shall not be

(1) stored or kept in the mine, except when required for rockwork, or when millisecond delay detonators are used and then only with the written permission of the district inspector, and

(2) taken into the mine, except in an explosive container approved by the district inspector, holding not more than 2 kg of explosives.

Use of Non-permitted Explosives

8.11.5 Notwithstanding section 8.11.1, authorization to use explosives other than "permitted explosives" may be granted by the chief inspector where

(1) the proposed blasting is to be carried out in solid rock, and

(2) an application has been made to the district inspector in the form shown in Appendix 8-2, and the district inspector supports the application.

Procedures for Shot Firing

8.11.6 When permitted explosives are used in an underground coal mine, the ***blaster*** shall

(1) check that each hole is properly drilled, thoroughly cleaned, and does not intersect any cracks or crevices,

(2) examine the area within 25 m of the hole to verify that it has been adequately treated with an approved incombustible dust, that the ventilation is normal, and that the level of flammable gas is less than 1%,

(3) only fire single shots, unless written permission has been obtained from the district inspector to fire more than one shot simultaneously or by millisecond delay detonators, and

(4) after firing the shots, inspect the area, including any electric cables, to satisfy himself that conditions are safe before allowing any other persons to enter the area. The ***blaster*** may be accompanied by one other person while carrying out the inspection.

Drilling for Reblasting

8.11.7 When a charge has misfired in a coal mine and another hole is required for reblasting, the shotfirer shall be responsible for directing the angle of the new drill hole, which shall be not less than 650 mm from the original hole.

Lighting and Power Circuits Not to Be Used

8.11.8 When shotfiring in an underground coal mine

(1) current from lighting or power circuits shall not be used for firing shots,

(2) electric power shall be cut off to the workplace when shots are being fired and not switched on again until the inspection required by section 8.11.6 (4) has been completed.

Appendix 8-1
British Table of Distances

Quantity of Blasting Explosives & Related Explosive Accessories Kilograms	Distance From: (1) Metres	Distance From: (2) Metres	Distance Between Mounded Magazines Metres
50	23	23	9
100	23	32	11
200	26	52	14
250	30	60	15
300	34	68	16
400	41	82	18
500	47	94	19
600	53	105	20
800	65	130	23
1 000	75	150	24
2 000	120	240	30
4 000	175	350	38
5 000	190	380	41
6 000	200	400	44
7 000	210	420	46
10 000	240	480	52
20 000	300	600	66
25 000	320	640	70
30 000	340	680	74
40 000	380	760	82
50 000	410	820	88
100 000	525	1 050	110
150 000	588	1 175	128

(1) (a) Highway, street, or other road accessible to the public.
   (b) Railway.
   (c) Aerodrome or airfield.
   (d) Bank of navigable waterway including canals or recreational waters.
   (e) Park, playground, sportsfield, or other open places used for recreation.
   (f) Work area.

(2) (a) Dwelling, living quarters.
   (b) Store, office, or similar building.
   (c) School, college, or university.
   (d) Hospital or rest home.
   (e) Church or chapel.
   (f) Theatre, auditorium, or assembly building.
   (g) Factory, workshop, service station, or garage.
   (h) Warehouse or storage area for flammable substances in bulk.

Appendix 8-2

Prescribed Form

Pursuant to section 8.11.5 (2) of the code, application is made on behalf of ____________________ (mine name) to use a non-permitted explosive for work in rock.

The following information is submitted in support of this application:

1. The attached mine plans, sections and notes outline the extent of the proposed work. Include appropriate plans to indicate:
    - location
    - starting point, direction, inclination, size of the heading and the location of adjacent coal seams and the nature of the strata to be penetrated.
2. A complete description of the proposed ventilation system, giving direction and volume of air and size and type of fans proposed.
3. The details and location of proposed explosive storage if any.

____

(Mine Manager)

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Definitions

"*dam*" means a barrier on the surface preventing uncontrolled release of either water or loose, solid material, or a barrier underground to prevent the uncontrolled flow of liquid or slurry.

"*depth of pile or dump*" means the distance measured vertically from the crest of a dump, pile, or fill, to the natural ground on which the fill has been formed or placed.

"*dike*" means a bank, usually of earth, to control or to confine water, a levee, or a barrier forming a reservoir or pond,

"*dump*" means an accumulation of rock fragments or other unconsolidated material formed by pushing or dropping the loose material over a crest and allowing it to come to rest without further handling.

"*embankment*" means a dam, fill, or dump raised from the ground or against a hill and having an exposed slope comprised of placed material.

"*embankment lift*" means a thin layer of fill laid in an embankment, fill, or dump.

"*fill*" means a deposit of discrete particles, either loose or well compacted, placed in layers or dumped into a ravine, valley, or depression.

"*height of slope*" means the difference in elevation between the crest or top of the slope and the toe or base of the slope.

"*impoundment*" means a body of water or poorly consolidated solid matter, confined by natural and/or constructed barriers and includes those barriers and related items.

"*ramp*" means a sloping roadway in a surface mine connecting two levels of excavation, or benches.

"*tailing*" means the residue remaining from the preparation of a concentrate of minerals or coal.

"*waste emplacement*" means a location of deposited waste including dumps, piles, lagoons, and impoundments.

Scope of Part 9

Scope

9.1.1 The scope of Part 9 includes

(1) ***stability of major dams, dumps, fills, and piles of rock or overburden,***

(2) security of major waste deposits and major impoundments or reservoirs at minesites, and

(3) control of surface runoff and infiltration into the ground related to the foregoing structures.

9.1.2 Dams, bulkheads and emplacements of waste which are not within the scope of section 9.1.1 are covered in Part 6 of the code.

Tailings Impoundment

9.1.3 Major tailings impoundments and related dams include

(1) any emplacement in which the maximum depth of tailings will be greater than 10 m at any point,

(2) an impoundment and its appurtenances for which a dike or dam is designed to be constructed to a maximum height, at any point, exceeding 15 m,

(3) any system of structures and ponds intended to contain more than one million cubic metres of tailings,

(4) any impoundment formed by constructed dikes containing more than 50 000 cubic metres of fill, and

(5) any other dam or impoundment so classified by the chief inspector.

Major Dams

9.1.4 A dam used either to store and control water or to trap sediment is a major dam if the maximum height at any point exceeds 15 m or is between 10 and 15 m high and has one or more of the following conditions

(1) a crest length exceeding 500 m,

(2) a flood discharge exceeding 2 000 cubic metres per second,

(3) a reservoir capacity greater than one million cubic metres, or

(4) is so declared by the chief inspector.

Major Dump

9.1.5 A major dump contains one or more of the following characteristics

(1) a planned volume which exceeds one million cubic metres,

(2) a height of dump in excess of 50 m,

(3) an area to be covered by a dump exceeding one hectare,

(4) it is founded upon natural or trimmed slopes which are sometimes steeper than 20 degrees from a horizontal plane,

(5) where waste material is dumped or placed in a water course having a potential peak flow greater than one cubic metre per second, once in every 200 years,

(6) it is situated in such a way that it may be a potential menace to a building, a road, a domicile, a prominent power transmission line, a pipeline, or a major water course, or

(7) it is so declared by the chief inspector.

Approvals

Application for Approval

9.2.1 (1) The manager shall make an application for approval to construct a major impoundment, dam, or waste dump, complete with all necessary supporting documents, to the chief inspector and copies of the complete application shall be sent to the district inspector and to other regulatory agencies specified by the chief inspector.

No Work to Commence Without Approval

(2) The manager shall ensure that no work is commenced on a major waste dump, dam, or impoundment without the written acceptance of the design by the chief inspector and possession of all other applicable permits and licences.

Surveillance Required

(3) The manager shall implement and maintain a surveillance and instrumentation program recommended in the design accepted by the chief inspector.

Design Requirements

9.2.2 Major waste emplacements and major impoundments or dams shall

(1) be designed by a qualified professional engineer registered in British Columbia, and

(2) comply with the specifications established by the chief inspector.

Notice of Work Required

9.2.3 Any work required to gather information when preparing a submission under section 9.2.1, shall be subject to the notice of work procedure required by section 6.1.1 of the code.

Long-term Stability

9.2.4 Prior to the abandonment of any impoundment, dam, or waste dump, the long-term stability of exposed slopes shall be assured to the satisfaction of the chief inspector.

Tailings Impoundments

Permission to Operate

9.3.1 No tailings impoundment shall be operated until

(1) the district inspector is satisfied that sufficient work has been carried out and sufficient precautions taken to enable safe, continuous operation in accordance with the approved design, and

(2) the manager has filed an "as built" document with the chief inspector and received his written permission to commence discharges and all other applicable permits and licences have been received.

Annual Report

9.3.2 The manager shall provide the chief inspector and the district inspector with an annual report on the operation and maintenance of the tailings disposal system.

Operating Manual

9.3.3 The manager shall prepare and maintain a current, tailings system operating manual and shall provide the district inspector and the employees involved in the operation of the tailings disposal system with a copy.

Declared Closure

9.3.4 Any impoundment not operated for a period of 12 or more months may be declared as closed by the chief inspector.

Closure Report 9.3.5 Upon closure or declared closure of tailing impoundment, the manager shall submit a report to the chief inspector for his acceptance listing the steps that will be taken to ensure structural stability and runoff control.

Reactivation 9.3.6 Closed or abandoned tailings impoundments shall only be re-activated on receiving written authorization from the chief inspector.

Water-Controlling Dams

Exemptions 9.4.1 Major water controlling dams shall be subject to the same requirements as tailings dams and their appurtenances in section 9.3 except an operating manual, an annual report, and closure report are not required.

Inoperative Dam 9.4.2 A reservoir or pond declared inoperative by an inspector shall be breached or otherwise disposed of in accordance with its licence under the *Water Act* or permit under the *Waste Management Act*.

Dumps

9.5.1 Material which has a high probability of spontaneous combustion shall be placed in a separate dump.

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Definitions

"abandoned mine" means a mine for which all permit obligations under the *Mines Act* have been satisfied and in respect of which the mineral claims have reverted to the Crown.

"average property basis" includes all areas where the land surface is disturbed, including (but not restricted to) pit, waste dumps, tailings impoundments, plant site, roads, and pipelines.

"closed mine" means a mine at which all mining activities have ceased but in respect of which the owner, agent or manager remains responsible for its compliance with the *Mines Act*, the regulations, and the code.

"factor of safety" means the ratio between the resistance of an earth mass against movement and the forces that cause movement.

"growth medium" means any soil material capable of supporting vegetation growth, and can be in situ or placed, native or treated.

"hard rock mineral mine" means any mine whose product is a mineral as defined in the **Mineral Tenure Act.**

"land productivity" means the capacity for producing a specified crop, usually expressed in growth rate or annual biomass units.

"overburden" means all unconsolidated soil material overlying bedrock.

"permit" means a permit issued pursuant to section 10 (3) of the *Mines Act*.

"quarry" means any surface hardrock mine whose product is not a mineral as defined in the **Mineral Tenure Act.**

"self-sustaining vegetation" means vegetation that will remain or which will, through succession, sustain itself indefinitely without maintenance.

"stability" means the safety of an earth mass against structural failure or movement.

"surficial soil material" means those soils commonly contained in the upper layers of the overburden mass, which are suitable for use in reclamation, either as growth medium, soil covers and seals, or other reclamation requirements.

"watercourse" means any natural stream or source of water, whether usually containing water or not, and includes any lake, river, creek, spring, ravine, swamp, and gulch.

Mine Plan and Reclamation Program Information

Exploration Placer Mines, Gravel Pits and Quarries

10.1.1 The plan filed with the district inspector in application for approval of coal and mineral exploration, placer mining, or sand and gravel ***pits and quarries*** in compliance with section 10 (1) of the *Mines Act*, shall consist of the appropriate ***Notice of Work*** and shall include

(1) a map or airphoto, or airphoto overlay at a convenient scale showing proposed work and reclamation and

Underground Work

(2) for underground work, an "Application for Approval of Underground Exploration Work" form and a detailed map of the present and proposed underground workings and surface installations.

Proposed Coal and Hardrock Mineral Mines

Producing Mines

10.1.2 The manager shall submit sixteen copies of the plan to the district inspector in compliance with section 10 (1) of the *Mines Act* for proposed coal and hardrock mineral mines, major expansions or major modifications of existing producing coal and hardrock mineral mines, and large pilot projects, bulk samples, trial cargos or test shipments, and the plan shall include

(1) a map or airphoto showing the location and extent of the mine, and the location of lakes, streams, and inhabited places in the vicinity of the mine,

(2) particulars of the nature and present uses of the land to be used with particular reference to

- (a) land ownership, including surface and mineral rights, licensed users including guides, outfitters, trappers,
- (b) climate,
- (c) geology and description of the deposit,
- (d) surface water and groundwater, including drainage, water quality, licensed water rights, hydrology, and fisheries,
- (e) groundwater, including water quality and hydrology,
- (f) soils and surficial geology,
- (g) vegetation,
- (h) wildlife, and
- (i) land capability and present uses, such as agriculture, forestry and recreation,

(3) particulars of the nature of the mine and the extent of the area to be occupied by the mine, with particular reference to

- (a) description of the mine and processing plant,
- (b) development schedule,
- (c) waste disposal, including tailings, waste rock, and overburden,
- (d) ***prediction of*** acid generation for all strata and deposits, ***including static and, if necessary, kinetic tests,***
- (e) stockpiling of surface soils materials,
- (f) protection of watercourses, including prediction of effluent quality for all disturbances,
- (g) drainage control, monitoring, and maintenance,
- (h) surface development and areas disturbed to date, projected over the next five years and projected over the life of the mine, and
- (i) source and use of any water required in the operation,

(4) a program for the protection and reclamation of the land and watercourses during the construction and operational phases of the mining operation, with particular reference to

(a) environmental monitoring and surveillance,

(b) a detailed reclamation program including research, for the next five years, summarized in tabular form and documented on a map or airphoto overlay at a convenient scale (1:10 000),

(5) a conceptual final reclamation plan for the closure or abandonment of the mining operation, with reference to, and consistent with, section 10.5 and 10.6, and

(6) an estimate of the total costs of outstanding reclamation obligations over the planned life of the mine, including the costs of long term monitoring and abatement. With the approval of the Chief Inspector, such information may be filed in a separate confidential report, and

(7) any other relevant information required by the district inspector.

Annual Report

10.1.3 The manager shall submit an annual reclamation report to the chief inspector by March 31 of the following year, and the report shall contain the information specified by the chief inspector.

Exceptions

10.1.4 Subsections 10.1.2 and 10.1.3 do not apply to hardrock mineral and coal exploration, placer mines, sand and gravel pits, and quarries unless required by the chief inspector.

Notice of Filing

Publication

10.2.1 When required by the chief inspector, notice of filing an application under section 10 (1) of the *Mines Act* shall be published, by the person filing it, in the Gazette and in those local newspapers specified by the chief inspector.

Written Response

10.2.2 Where a notice of filing has been published under section 10.2.1, a person affected by, or interested in, the application has 30 days after the last date on which the notice was published to view the application and make written representations to the chief inspector.

Referral to Other Agencies

Mine Development Review Committee

10.3.1 The chief inspector or the district inspector shall refer to the advisory committee or the regional advisory committee established pursuant to section 9 of the *Mines Act*, all applications submitted under section 10.1.2 and may, where he deems it to be appropriate, refer any ***Notice of Work*** submitted under section 10.1.1 of this code.

10.3.2 The advisory committee or regional advisory committee shall review every application referred to them and make recommendations to the chief inspector or district inspector within 60 days following application.

Circulation of Application

10.3.3 Where a permit application under section 10.1.1 of this code is not referred to a committee for review under section 10.3.1 of this code, the district inspector shall circulate it to other ministries and agencies specified by the chief inspector and they will have 30 days following referral to make written representations.

Permit

10.4.1 A permit issued under section 10 (1) of the *Mines Act* shall take into consideration:

(1) any written representations received under subsection 10.2.2 of this code,

(2) any recommendations made by a committee under subsection 10.3.2 of this code,

(3) any written representations received under subsection 10.3.3 of this code, and

(4) any additional information which may be requested by an inspector in order to evaluate the application.

Mine Closure

Notice Required

10.5.1 The owner, agent, or manager shall provide written notice of not less than 7 days to the district inspector of intention to stop work in, on, or about a mine.

10.5.2 If a mine ceases operation for a period longer than one year, the owner, agent, or manager shall either continue to carry out the conditions of the permit or apply for an amendment setting out a revised program for approval by the chief inspector.

Refund of Security

10.5.3 On the closure of a mine, and on the chief inspector or district inspector being satisfied that the conditions of the permit were complied with, the person who deposited a security under section 10 (4) or 10 (5) of the *Mines Act* shall be entitled to refund of ***the security and any accumulated interest***, less any amount paid out under section 10 (7) of the *Mines Act*.

Indefinite Closure

10.5.4 When a mine is closed down permanently or for an indefinite period, or otherwise left unattended for any length of time, the owner, agent or manager shall cause the entrances to the mine and all other pits and openings that are dangerous by reason of their depth or otherwise, ***to be protected against inadvertent access, to the satisfaction of the inspector, and***

Securing Openings

(1) prior to mine abandonment all shafts, raises, stope openings adits, or drifts opening to the surface shall be either capped with a stopping of reinforced concrete or filled with material so that subsidence of the material will not pose a future hazard, and

(2) in the case of shafts or raises, the stopping shall be secured to solid rock or to a concrete collar secured to solid rock and capable of supporting a uniformly distributed load of 12 Kpa or a concentrated load of 24 kN, whichever is greater.

Filing of Plans

10.5.5 (1) On the closure of a mine, the owner, agent or manager shall, within 90 days following mine closure, file with the chief inspector an accurate plan, on a scale consistent with good engineering practice, showing the workings of the mine up to the time of closure and the boundaries of the mineral claims, licences, or leases in which the workings are situated.

(2) The filed plan, or a copy of it, shall be preserved as a permanent record in the office of the chief inspector.

10.5.6 On the closure of a mine, the owner, agent or manager of the mine shall remove or dispose, to the satisfaction of the inspector, of all explosives and all chemicals and reagents.

Reclamation Standards

Reclamation Defined

10.6.1 It is the duty of every owner, agent, and manager to institute and during the life of the mine to carry out a program of environmental protection and reclamation, in accordance with the standards described in this section.

Application

10.6.2 The reclamation standards prescribed in this Part shall apply to any mine except

Pre-legislation Disturbances

(1) where environmental disturbance occurred prior to the enactment of reclamation legislation in 1969, and has remained inactive since this time, in which case that portion of environmental disturbance which occurred before the enactment of reclamation legislation in 1969 is exempt from the revegetation provisions,

Exclusions

(2) where any mine is specifically excluded by a condition of its reclamation permit from complying with a particular standard,

(3) where any disturbances created by a mining activity has been reclaimed, inspected, and found to be satisfactory.

Land Use

10.6.3 The land surface shall be reclaimed to an acceptable use that considers previous and potential use.

Productivity

10.6.4 The level of land productivity to be achieved on reclaimed areas shall not be less than existed prior to mining on an average property basis unless the owner, agent, or manager can provide evidence which demonstrates to the satisfaction of the chief inspector the impracticality of doing so.

Long Term Stability

10.6.5 Land and watercourses shall be left in a stable condition. Engineered structures including waste dumps, major haul roads, and tailings impoundments shall have a factor of safety in accordance with sections 9.2.2 and 9.2.4 of this code to ensure long term stability.

Revegetation

10.6.6 Land shall be revegetated to a self sustaining state using appropriate plant species.

Growth

10.6.7 On all lands to be revegetated, the growth medium shall satisfy land use, productivity, and water quality objectives. All surficial soil material removed for mining purposes shall be saved for use in reclamation programs unless these objectives can be otherwise achieved.

Structures and Equipment

10.6.8 Prior to abandonment, and unless the chief ***inspector*** has made a ruling with respect to heritage project consideration

Clean Up

(1) all machinery, equipment and building superstructures shall be removed,

(2) concrete foundations shall be covered and revegetated unless, because of demonstrated impracticality, they have been exempted by the inspector, and

(3) all scrap material shall be disposed of in a manner acceptable to the inspector.

Waste Dumps

10.6.9 Waste dumps shall be reclaimed to ensure

(1) long-term stability,

(2) long-term erosion control,

(3) water quality released from waste rock dumps to the receiving environment is of a standard acceptable to the inspector, and

(4) land use and productivity objectives are achieved.

Watercourses

10.6.10 Watercourses shall be reclaimed to a condition that ensures

(1) long-term water quality is maintained to a standard acceptable to the inspector,

(2) drainage is restored either to original watercourses or to new watercourses which will sustain themselves without maintenance, and

(3) use and productivity objectives are achieved and the level of productivity shall not be less than existed prior to mining unless the owner, agent or manage can provide evidence which demonstrates, to the satisfaction of the chief inspector, the impracticality of doing so.

Pit Walls

10.6.11 (1) Pit walls constructed in overburden shall be reclaimed in the same manner as waste dumps ***unless the chief inspector is satisfied that to do so would be unsafe or conflict with other proposed land uses.***

(2) Pit walls constructed in rock, and/or steeply sloping footwalls, are not required to be revegetated. Pit wall seepage may require treatment to ensure that water is of a quality acceptable to the chief inspector.

(3) Where the pit is free from water, and safely accessible, vegetation shall be established.

(4) Where the pit floor will impound water, provision must be made to create a body of water where use and productivity objectives are achieved.

Tailings Ponds

10.6.12 (1) All tailings ponds and impoundment structures shall be reclaimed to the approved land use.

(2) Prior to mine closure, a report shall be submitted to the chief inspector outlining the post-operational state of the dams, dikes, related seepage control, spillway works, mine water deportment, and post-operational monitoring.

Spillways

(3) A permanent spillway shall be designed to a standard required by the chief inspector, and installed prior to final abandonment of the tailings dam.

Roads

10.6.13 All roads shall be reclaimed in accordance with land use objectives unless permanent access is required to be maintained.

Metal Uptake

10.6.14 (1) Vegetation shall be monitored for metal uptake.

(2) Where harmful metal levels are found, reclamation procedures shall ensure that levels are safe for plant and animal life.

Disposal of Toxic Chemicals

10.6.15 Chemicals or reagents which cannot be returned to the manufacturer are to be disposed of as directed by the chief inspector in compliance with municipal, regional, provincial and federal statutes.

Acid Generating Material

10.6.16 All potential acid generating material shall be placed in a manner which minimizes the production and release of acid mine drainage to a level that assures protection of environmental quality.

Monitoring

10.6.17 The owner, agent, or manager shall undertake monitoring programs, as required by the chief inspector, to demonstrate that reclamation objectives including land use, productivity, water quality, and stability of structures are being achieved.

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Schedules

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Definitions

"designated area" means an area of the Province that

(1) is subject to mineral tenure under the *Mineral Tenure Act* referred to in Schedule A, or

(2) is within a circle with a radius described in Schedule A.1.

"designated site" means a site in the Province referred to in a notice sent to the chief inspector under section 11.4.1 of the code.

"exploration" means the search for coal, minerals, rock, limestone, earth, clay, sand or gravel by drilling, trenching, excavation, blasting, disturbance of the ground by mechanical means, or prescribed geophysical equipment, including underground work.

"prescribed geophysical equipment" means exposed electrodes used on induced polarization surveys.

Notice and Approval to Work

Notice

11.1.1 The owner, agent, or manager shall make application in writing on the prescribed form pursuant to section 10 of the *Mines Act* to the district inspector at least 30 days prior to intended commencement of exploration work, and the application shall be acknowledged within 15 days and an indication given to the applicant as to the earliest start date.

Approval

11.1.2 Surface work on an exploration property subject to the application in section 11.1.1. shall not commence without the approval of the district inspector.

First Aid, Communication and Training

First Aid Requirements

11.2.1 ***Minimum*** first aid requirements on an exploration site shall be in accordance with Workers Compensation Board regulations.

Supplies

11.2.2 All active exploration drill sites shall be equipped with a minimum #2 first aid kit, a stretcher, an audible emergency signal device, and some form of radio communication acceptable to the inspector.

11.2.3 At exploration drill sites, all members of the drill crew shall have a valid St. John's "Standard" first aid certificate unless the drill site is ***accessible in all weather conditions*** within 5 minutes of the main camp ***or other facility*** where there is a qualified first aid attendant.

Communication

11.2.4 Isolated camps shall have a means of communication for obtaining emergency transportation to a hospital or clinic.

Training

11.2.5 The manager shall ensure that any persons employed for the first time at an exploration site have been adequately instructed in any potential hazards in the region and how to protect themselves; such instruction shall include advice on protection from attacks by wild animals, the wearing of appropriate clothing, protective gear, the need for suitable equipment to avoid becoming lost, and safety procedures to be adopted for aircraft operations (section 11.6), and boat handling.

Transportation of Persons

11.2.6 No person shall be transported in the box of a pickup truck, and no person shall ride in a standing position in a crew vehicle (bus).

Electrical Surveying Systems

Electrical Surveying

11.3.1 Where an induced polarization geophysical system is being operated

(1) all energized wires shall be sufficiently insulated to prevent an electric shock when the system is being operated at its maximum rated voltage,

(2) the induced polarization electrodes shall have visible warning stickers stating "Danger — High Voltage"

(3) the person in charge of the survey shall ensure that

(a) signs shall be posted at the entrances to the area where induced polarization surveys are being carried out to warn other persons who may enter the area,

(b) radio communication is provided to a member of the crew whose movements are out of sight and sound of the other crew members, and

(c) all signs are removed on completion of the survey and no wires used during the survey are left on the site after the survey is completed, and

(d) electric blasting activities are coordinated with active induced polarization and active electromagnetic survey work.

Uranium/Thorium Exploration

Designated Site

11.4.1 (1) Where a person intends

(a) to commence exploration or cause exploration to be commenced for uranium, thorium or both, or

(b) to commence exploration or cause exploration to be commenced in a designated area

he shall notify the chief inspector and the district inspector of his intention by filing on the prescribed form, obtainable from the district inspector, at least 30 days before commencing exploration.

(2) A person who notifies the chief inspector and the district inspector under subsection (1) shall forthwith after filing that information with the chief inspector and the district inspector, cause a notice of the location of the intended exploration to be published in the Gazette and in a newspaper that circulates in the area close to the designated site.

Baseline Survey

11.4.2 In addition to all the requirements of the *Mines Act*, the regulations and the code, no person shall commence exploration or cause exploration to be commenced at a designated site until

(1) a baseline survey of the designated site has been conducted in accordance with the requirements of Schedule B of this code,

(2) a copy of the results of that baseline survey has been filed with the chief inspector and the district inspector, and

(3) the chief inspector has given his written approval for the intended exploration at that designated site.

Testing for Uranium and Thorium

11.4.3 (1) Every owner, agent, or manager of a mine at a designated site shall, during exploration at the designated site

(a) ensure that all drill cores taken during exploration, and other excavated or disturbed materials resulting from exploration at that site, are tested as soon as practicable

(i) in the case of a drill core, after the drill core is removed from the ground, and

(ii) in the case of materials excavated or disturbed, after the materials are excavated or disturbed, as the case may be,

for gamma radiation to detect if uranium or thorium mineralization is present,

(b) where under subsection (1) (a), gamma radiation is detected as being above background level for the designated site, determine as soon as practicable after that detection, the grade of uranium or thorium or both, as the case may be, and

(c) keep a written record at that designated site of the grade of uranium or thorium determined under subsection (1) (b).

(2) Where a grade is to be determined under subsection (1) (b), a sample shall consist of a continuous section one metre or more in length

(a) of drill core, or

(b) from a trench, pit, or other excavation and the sample shall be not less than 10 kg in weight.

Report and Further Work Where Significant Uranium or Thorium is Present

11.4.4 Where an assay under section 11.4.3 (2) indicates uranium in an amount of 0.05% or more by weight, or thorium in an amount of 0.15% or more by weight, the owner, agent, or manager at the designated site shall ensure that

(1) the chief inspector and the district inspector are informed within 7 days of their being notified of the assay result, and

(2) further exploration, termination of exploration, or other related work at the designated site is conducted only in accordance with Schedule C.

Exploration at a Site Other Than a Designated Site

11.4.5 (1) Mineral assays of exploration samples from a site that is not a designated site shall include an assay for uranium and thorium when ordered by the chief inspector.

(2) A sample ordered under subsection (1) shall consist of a continuous section 1 m or more in length

(a) of drill core, or

(b) from a trench, pit, or other excavation, and the sample shall be not less than 10 kg in weight.

(3) Where an assay under subsection (1) indicates uranium in an amount of 0.05% or more by weight, or thorium in an amount of 0.15% or more by weight, the owner, agent, or manager at the site shall ensure that

(a) the chief inspector and the district inspector are informed within 7 days of notification of the assay result,

(b) the prescribed form, obtainable from the district inspector, is filed with the chief inspector and the district inspector within 72 hours of being notified of the assay result,

(c) a baseline survey of the site is conducted within 14 days of being notified of the assay result in accordance with Schedule B, if the site is still active, but if the site is no longer active the baseline survey shall be carried out prior to any further exploration,

(d) a copy of the results of the baseline survey is filed with the chief inspector and the district inspector as soon as practicable,

(e) further exploration, termination of exploration, or other related work at the site is conducted only in accordance with Schedule C, and

(f) cause a notice of the location to be published in the Gazette and in a newspaper that circulates in the area close to the designated site.

Schedule A

Designated Areas

(1) For each point expressed in terms of latitude and longitude in the following list, a radius of 5 km centered on that point

Points expressed in latitude and longitude	*Name*	*Mining Division*
49 32 30-118 53 00	Fuki	Greenwood
49 35 40-118 54 00	Cup Lake, Donen	Greenwood
49 37 30-118 55 00	Blizzard	Greenwood
49 45 20-119 07 35	Haynes Lake	Greenwood
49 47 45-119 23 05	Hydraulic Lake, Tyee	Greenwood
49 35 30-119 42 20	Prairie Flats	Osoyoos
49 14 10-119 32 45	Covert Basin	Osoyoos
49 11 50-119 35 20	Sinking Pond	Osoyoos
49 12 45-119 34 30	North Wow Flat	Osoyoos
49 37 50-119 44 20	The Stinkhole	Osoyoos
49 14 10-119 35 00	Meyers Swamp	Osoyoos
51 33 40-119 54 40	Rexspar	Kamloops
52 23 55-119 09 25	Verity	Kamloops
50 53 45-122 57 20	Little Gem	Lillooet

(2) For each point expressed in terms of latitude and longitude in the following list, a radius of 500 metres centered on that point

Points expressed in latitude and longitude	*Name*	*Mining Division*
49 31 30-118 53 00	Collier, Donen	Greenwood
49 35 55-118- 55 30	Lassie, Donen	Greenwood
49 31 05-119 10 00	Carmi Moly, Doe	Greenwood
49 46 50-119 04 30	Venus, PB	Greenwood
49 07 20-118 23 25	SD 7, Radar	Greenwood
49 07 10-118 23 50	SD 18 and 20	Greenwood
49 06 30-118 23 05	SD 37	Greenwood
49 05 55-118 23 00	SD 41	Greenwood
49 07 20-118 23 00	SD 8	Greenwood
49 07 25-118 24 20	Kiwi, Radar 3	Greenwood
49 05 55-118 26 55	PBE 14	Greenwood
49 05 10-118 26 50	BPE 18, U2	Greenwood
49 03 10-118 25 00	HO 16	Greenwood
49 38 57-119 45 25	Faulder 3	Osoyoos
49 39 10-119 48 00	Johnson's Slough	Osoyoos
49 33 45-119 47 30	Agur	Osoyoos
49 32 40-119 52 00	Riddle Creek	Osoyoos
49 41 00-119 59 20	Demuth	Osoyoos
49 37 45-119 41 05	Ignimbrite Lake	Osoyoos
49 30 40-119 38 30	Westbench	Osoyoos
49 39 50-119 44 20	Eneas	Osoyoos
49 37 00-119 42 45	Contact Pool	Osoyoos
49 39 50-119 45 40	Three Peak Basin	Osoyoos
49 40 30-119 52 00	Bald Hills	Osoyoos
49 38 25-119 45 40	Meadow Ridge	Osoyoos
49 51 00-119 49 50	Trepanier	Osoyoos
49 59 45-119 25 00	Winn	Osoyoos
49 29 20-119 46 00	Brent Lake, Clark	Osoyoos
49 11 10-119 34 40	Contact Lake, OL I	Osoyoos

Points expressed in latitude and longitude	*Name*	*Mining Division*
49 27 45-119 45 20	Farleigh Lake	Osoyoos
49 11 50-119 33 30	Gypo Greisen	Osoyoos
49 27 00-119 38 30	Skaha Reservation	Osoyoos
49 12 30-119 34 35	South Wow Lake	Osoyoos
49 12 20-119 37 00	Burnell Pond	Osoyoos
49 14 05-119 35 59	Powerline Pond	Osoyoos
49 13 00-119 34 55	Heart	Osoyoos
49 13 15-119 34 30	Purple	Osoyoos
49 13 00-119 35 00	Polvo	Osoyoos
49 13 24-119 34 55	Ranch Lake	Osoyoos
49 22 45-119 37 30	Kaleden	Osoyoos
49 29 20-119 40 40	Nkwala Cases	Osoyoos
49 23 35-119 21 03	Allendale Lake	Osoyoos
49 42 00-117 26 00	Try Again	Slocan
50 42 30-116 50 20	East Creek	Slocan
50 12 20-117 55 40	Sta-Tite	Slocan
49 33 00-117 18 30	Crystal	Nelson
49 07 30-116 26 30	Lucky	Nelson
49 05 00-117 11 40	Molly (L 14232)	Nelson
49 29 40-117 23 20	Lucky-Bill-Tag	Nelson
49 22 50-117 38 10	Gibson Creek	Nelson
49 27 35-117 35 30	Crescent, Lucky Boy	Nelson
49 28 05-117 33 10	Jackass	Nelson
49 04 35-117 11 22	M.U.T.	Nelson
49 22 50-116 10 15	Cariboo	Fort Steele
49 02 29-114 16 25	LIN 22	Fort Steele
49 02 50-114 16 00	LIN 20	Fort Steele
49 02 30-114 16 25	LIN 21	Fort Steele
49 10 20-114 23 50	Commerce	Fort Steele
49 14 00-117 42 00	Mota, China Ck.	Trail Creek
49 15 59-117 40 20	Roma	Trail Creek
49 14 10-117 41 30	U308, China Ck.	Trail Creek

Points expressed in latitude and longitude	*Name*	*Mining Division*
50 39 00-116 23 30	Forster	Golden
50 38 15-116 31 15	Stan, Annette 55	Golden
50 37 40-116 27 50	Slide, Ice 9	Golden
51 57 00-118 03 40	Trident CR	Golden
51 11 40-116 21 00	Bow, Demon	Golden
51 10 00-116 22 55	Waterloo, Colt I	Golden
51 18 10-116 53 10	King David	Golden
50 45 35-118 01 45	Cran 3	Revelstoke
50 46 50-118 02 20	Cran 2	Revelstoke
50 44 15-118 00 20	Cran 4	Revelstoke
50 46 20-118 06 20	Cameron-Jenkins #2	Revelstoke
50 47 40-118 04 30	Cameron-Jenkins #1	Revelstoke
50 50 30-118 06 00	Karen, Arcl	Revelstoke
50 51 20-118 07 20	Mulvehill	Revelstoke
50 41 35-119 24 00	Jen Jen	Kamloops
50 43 20-119 23 05	Syphon	Kamloops
51 34 30-119 51 35	Bullion	Kamloops
51 34 20-119 53 50	G Zone	Kamloops
51 36 00-119 09 40	Harbour	Kamloops
52 17 55-119 09 55	Bone Cr, Gum Cr	Kamloops
52 08 00-119 11 00	AEG, Mud Lake	Kamloops
50 42 30-120 36 10	Copper King	Kamloops
50 31 35-120 28 30	Vicars Pass	Kamloops
50 34 25-120 08 40	Rub	Kamloops
50 15 35-121 33 45	Rad	Kamloops
50 18 40-121 38 30	Orlean	Kamloops
50 15 00-121 34 00	Rosyd, Botanie	Kamloops
50 15 00-121 35 40	Lytton Bar	Kamloops
51 11 55-118 53 30	Val, Vidler	Vernon
50 14 45-118 48 30	Spar	Vernon
50 19 00-118 50 10	SH, AS	Vernon

Points expressed in latitude and longitude	*Name*	*Mining Division*
50 28 45-119 06 20	Brett-Bird	Vernon
50 03 55-119 31 40	Bald	Vernon
50 08 00-119 26 30	Mary Ellen	Vernon
49 00 30-121 08 30	International	New Westminster
49 16 40-121 47 40	Bee, Bell	New Westminster
49 24 00-121 26 00	Hope	New Westminster
50 11 50-120 36 00	Copperado-A6	Nicola
50 31 35-122 00 10	Index, Moly	Lillooet
50 07 00-125 16 00	Radium, Senator	Nanaimo
51 05 45-123 23 20	Mohawk, Motherlode	Clinton
52 06 22-127 44 51	Promise Well	Skeena
56 06 00-129 31 00	Stewart	Skeena
53 59 02-124 51 41	Abe, Molly, Nithi	Omineca
54 10 20-125 07 20	Loon	Omineca
55 10 00-127 34 00	Blue Lake	Omineca
55 10 15-127 33 30	Black Prince	Omineca
55 08 20-127 36 00	Red Rose	Omineca
55 10 20-127 39 00	Victoria	Omineca
55 10 30-127 42 55	Golden Wonder	Omineca
55 40 40-124 23 00	Lonnie, Wolverine	Omineca
55 42 40-124 25 05	Brent, Virgil	Omineca
55 35 00-125 19 00	Smoke	Omineca
57 18 00-126 01 30	Tor	Omineca
57 18 30-127 22 00	Lawyers Pass	Omineca
57 48 00-125 12 30	Grey Peak, Kechika	Omineca
53 57 20-121 39 00	Gold — Thorium	Cariboo
53 17 50-120 07 40	McBride	Cariboo
53 48 21-121 52 40	Lad, UG, Bowron R.	Cariboo

Points expressed in latitude and longitude	*Name*	*Mining Division*
54 04 17-122 19 44	Samson, Giscome	Cariboo
56 31 14-123 56 21	Laura 2	Liard
57 22 10-127 30 00	Edozadelly Mtn.	Liard
57 38 00-131 27 50	Hel	Liard
57 57 45-125 44 00	Spa, Stag, Red	Liard
59 25 40-126 10 00	Liard Hotsprings	Liard
59 30 40-125 57 00	Wishing Well	Liard
59 54 50-134 56 30	NET 6	Atlin
59 55 00-134 58 40	NET 3	Atlin
59 58 00-135 19 20	Jones	Atlin
59 42 20-133 51 30	Husselbee, Beaver	Atlin
59 43 20-133 18 55	Purple Rose	Atlin
59 41 49-133 24 13	Black Diamond	
59 40 10-133 20 00	RU	Atlin
59 42 30-133 26 20	Fisher	Atlin
59 41 05-132 53 00	Snowbird, MIR 8	Atlin
59 36 05-133 11 15	Dixie, Mont	Atlin
59 39 45-132 59 20	CY 4, Weir Mtn.	Atlin
59 46 50-133 16 00	IRA 5	Atlin
59 42 50-133 16 00	WMC	Atlin
59 43 50-133 18 50	Pato 1	Atlin
59 44 50-133 18 00	Mistake	Atlin
59 45 45-133 16 20	D&D, Dave	Atlin
59 46 00-133 16 00	IRA 6	Atlin
59 47 30-133 15 20	IRA	Atlin
59 37 50-132 50 00	CX 2	Atlin
59 38 20-132 49 30	Mir 7, Delta Pool	Atlin
59 39 00-132 50 00	Mir 3, Radon, Cirque	Atlin
59 41 00-132 47 00	CX	Atlin
59 49 10-133 08 20	Tupa	Atlin
59 39 00-131 08 00	Shar 6	Atlin

(3) For a linear trend starting at each point expressed in latitude and longitude, to the head waters of the named creek, and a width of 50 meters on either side of the centre of the creek

Points expressed in latitude and longitude	*Name*	*Mining Division*
50 55 45-116 55 45	Vowell Creek	Golden
50 51 30-116 52 20	Malloy Creek	Golden
50 42 00-116 45 10	Upper Bugaboo	Golden

Schedule B

Baseline Survey Requirements

Gamma Radiation Measurements

(1) Gamma radiation measurements shall be taken 1 m above the existing surface

- (a) on a grid pattern with each grid having sides not greater than 10 m in length at every place on the designated site that drilling, stripping, trenching, pitting, or other excavation including road making will be carried out,
- (b) at other places specified by an inspector.

Water Samples

(2) (a) Water samples shall be taken in accordance with Schedule E from all water courses and ground water that are capable of being affected by the exploration.

(b) Water samples taken under section 2 (a) of this Schedule shall be analyzed in accordance with Schedule D by a laboratory experienced in analyzing for dissolved uranium, gross alpha and any other constituents required by the chief inspector.

Results of Survey

(3) The results of the gamma radiation survey and the analyses of water samples taken under sections (1) and (2) (a) of this Schedule, and a map showing the location where the measurements and samples were taken, shall be sent to the chief inspector by the owner, agent, or manager of the mine at that designated site.

Surveys for Radioactivity

(4) The owner, agent, or manager of a mine at a designated site shall ensure that measurements for radioactivity required under sections (1) and (2) of this Schedule are carried out at the designated site with instruments that are calibrated in accordance with Schedule E and the manufacturer's instructions and used by persons knowledgeable in the use of these instruments.

Schedule C

Exploration on Designated Sites

Sealing of Drill Holes

(1) (a) Unless the chief inspector permits otherwise under the *Act*, all surface drill holes at a designated site that encounter uranium mineralization in a grade of 0.05% by weight or greater or thorium mineralization in a grade of 0.15% by weight or greater shall be completely filled with concrete on completion of exploration at that designated site.

(b) Before sealing a surface drill hole under section 1 (a) of this Schedule, an inspector shall be informed of the procedure to be used in sealing that surface drill hole.

(c) After a drill hole is sealed in accordance with section 1 (a) of this Schedule it shall be marked in a durable way with the following information

(i) the name of the owner of the mine,

(ii) the date the drill hole was sealed,

(iii) the depth and length of the drill hole.

(d) A plan showing the location, size, depth, and length of each drill hole sealed pursuant to this Schedule shall be forwarded to an inspector at the end of the exploration season in which it was sealed.

Water

(2) (a) Where there is surface drilling at a designated site, the owner, agent, or manager of the mine at that designated site shall take all the necessary steps to ensure that no drilling fluid, water, or drill cuttings contaminate any drinking water supply, irrigation water supply, or surface water.

(b) Where ground water issues from a borehole during surface exploration at a designated site, the owner, agent, or manager of a mine at that designated site shall ensure that the flow of water from the borehole is stopped or contained in a containment structure prepared for that purpose, and that is capable of preventing any escape of the ground water into surface drainage water until

(i) samples of the ground water from this borehole have been taken and analyzed for radioactivity and dissolved uranium, in accordance with Schedule E, by a laboratory experienced in analyzing for radioactivity and dissolved uranium, and

(ii) the results of the analyses under paragraph (i) above shows that the ground water from the borehole

(A) conforms to the Guidelines for Canadian Drinking Water Quality: 1987 (Health and Welfare Canada), or

(B) does not exceed the average background level of radioactivity or dissolved uranium in the water at the site by more than 10% of the water quality standards of the Guidelines for Canadian Drinking Water Quality: 1987 (Health and Welfare Canada).

(2) (c) The owner, agent, or manager of a mine at a designated site shall ensure that copies of the test results referred to in section 2 (b) (i) of this Schedule are forwarded to the chief inspector and the district inspector within 14 days after receipt from the laboratory.

Surface Disturbance Other Than Drilling

(3) (a) The owner, agent, or manager of a mine at a designated site shall take all the necessary steps to ensure that no water escapes from any surface pit, trench or other excavation at the designated site until

(i) samples of the water from the surface pit, trench, or other excavation, as the case may be, have been taken and analyzed for radioactivity and dissolved uranium in accordance with Schedule D by a laboratory experienced in analyzing for radioactivity and dissolved uranium, and

(ii) the results of the analyses under section 3 (a) (i) of this Schedule show that the water from the surface pit, trench or other excavation

(A) conforms to the Guidelines for Canadian Drinking Water Quality: 1987 (Health and Welfare Canada), or

(B) does not exceed the average background level of radioactivity or dissolved uranium in the water at the site by more than 10% of the water quality standards of the Guidelines for Canadian Drinking Water Quality: 1987 (Health and Welfare Canada).

(b) The owner, agent, or manager of a mine at a designated site shall ensure that copies of the test results referred to in section 3 (a) of this Schedule are forwarded to the chief inspector and the district inspector within 14 days after receipt from the laboratory.

Sample and Core Storage

(4) (a) No owner, agent, or manager of a mine at a designated site shall store on the surface of the designated site, drill cores or exploration samples containing uranium in a grade of 0.05% by weight or greater, or thorium in a grade of 0.15% by weight or greater during the period of exploration at the designated site except

- (i) in an enclosed facility, or
- (ii) a non-enclosed storage area that has been approved by an inspector.

(b) Where drill cores or exploration samples that contain uranium or thorium are stored pursuant to section 4 (a) of this Schedule, the owner, agent, or manager of the mine at that designated site shall ensure that

- (i) in the case of drill cores or exploration samples stored in an enclosed facility
  - (A) the drill cores and exploration samples are not accessible to any person other than a person authorized by the manager,
  - (B) the enclosed facility is locked or otherwise secured when it is not in use,
  - (C) the enclosed facility is adequately ventilated, and
  - (D) a radiation warning sign is posted at or near the enclosed facility prohibiting entry unless authorized by the manager, and
- (ii) in the case of drill cores or exploration samples placed in a non-enclosed storage area
  - (A) the drill cores and exploration samples are not accessible to any person other than a person authorized by the manager, and
  - (B) a radiation warning sign is posted at or near the storage area prohibiting access unless authorized by the manager.

(4) (c) The owner, agent, or manager of a mine at a designated site shall cause all drill cores and exploration samples stored pursuant to section 4 (a) of this Schedule to be monitored

(i) in the case of an enclosed facility, for levels of radon daughters and gamma radiation at such times and in such a manner so as to ensure that no person entering the enclosed facility is exposed to a level of radiation greater than that prescribed in Part 2 of the code, and

(ii) in the case of a non-enclosed storage area, for levels of gamma radiation at such times and in such a manner so as to ensure that no person entering into the non-enclosed storage area is exposed to a level of radiation greater than that prescribed in Part 2 of the code.

(d) When drill cores or exploration samples containing uranium or thorium or both are shipped from a designated site, the owner, agent, or manager of the mine at the designated site shall keep a copy, and forward to the chief inspector a copy of a report that contains the following information

(i) the location on the designated site from where the drill cores or exploration samples were taken,

(ii) the weight of the drill cores or exploration samples shipped,

(iii) the type of rock, gravel, sand, or other material containing the uranium or thorium,

(iv) the grade of the uranium or thorium if known,

(v) the date of shipment,

(vi) the person to whom the drill cores or exploratory samples were shipped.

Gamma Radiation Exposure

(5) (a) During exploration at a designated site, the owner, agent, or manager of a mine at the designated site shall ensure that gamma radiation measurements are taken at all newly disturbed areas and at other places on the site when directed by the chief inspector or the district inspector, and the gamma radiation measurements shall be taken in the same manner as set out in section 4 of Schedule B and the results forwarded to the chief inspector and the district inspector at intervals as defined in the approval issued under section 11.4.2 (c) of the code.

(b) Where gamma radiation measurements indicate that a person working at a designated site may receive a radiation dose greater than 2.5 microsieverts/hr, a gamma radiation dosimeter of a type approved by the chief inspector shall be provided to, and worn by, each person who could be so exposed.

(c) A person working at a designated site shall not receive a dose to the whole body of more than 5 millisieverts in a period of one year.

Termination of Exploration at Designated Site

(6) (a) Where exploration at a designated site ceases and any exposed surface or excavated material, including any drill cores, exploration samples and rock piles on the surface at that designated site, emits radiation above the level measured during the baseline survey at that location, the owner, agent, or manager of the mine at the designated site shall, subject to section (2) of this Schedule, ensure that the level of radiation is restored to a value not greater than 0.6 microsieverts/hour above the level of radiation measured at that location during the baseline survey, by covering the exposed surface or excavated material with suitable material.

(6) (b) The owner, agent, or manager shall, following the completion of the reclamation work, send readings of the level of radiation taken at the surface of a designated site within 14 days to the chief inspector and the district inspector.

(c) The owner, agent, or manager of the mine at a designated site need not comply with section 6 (a) of this Schedule where any one of them has received an exemption from the chief inspector.

(d) The owner, agent, or manager of a mine at a designated site shall take the steps necessary to minimize the risk of erosion of any cover material placed in accordance with section 6 (a) of this Schedule.

Radon Daughters in Underground Exploration Areas

(7) (a) The owner, agent, or manager of a mine at designated site shall, where underground exploration of the designated site is being carried out, ensure that the air in all parts of the underground exploration area where persons work or through which they pass is sampled daily to determine the concentration of radon daughters and tested daily to determine the level of gamma radiation.

(b) The method of sampling and testing for radon daughters under section 7 (a) of this Schedule shall be done in the manner required by an inspector.

(c) The owner, agent, or manager of a mine at a designated site shall, where underground exploration at the designated site is being carried out, ensure that

(i) records showing the total exposure to radon daughters for each person who works in the underground exploration area at the designated site are kept at the designated site,

(ii) copies of the records referred to in paragraph 7 (c) (i) are sent to the chief inspector once a month and given to each person who has been exposed, during the month following that person's exposure, and

(7) (c) (iii) a person who works in the underground exploration area is not exposed to

(A) more than 0.2 working level months of radon daughters per quarter of a year, nor

(B) more than 0.4 working level months of radon daughters per year.

Smoking Prohibited Underground

(8) The owner, agent, or manager of a mine at a designated site shall cause signs prohibiting smoking to be posted at an underground exploration area at the designated site where a person has been or could be exposed to radon daughters while working there.

Inactive Exploration Area

(9) (a) Where any entrances, pits, or openings on a designated site are fenced or otherwise protected against inadvertent access, the owner, agent, or manager of the mine at the designated site shall ensure that signs warning of radiation are kept posted at the designated site.

(b) No person shall enter into an underground exploration area at a designated site where signs warning of radiation have been posted at that site, unless the person is allowed to enter by the owner, agent, or manager for the designated site.

(c) No person shall grant permission under section 9 (b) of this Schedule unless the underground exploration area meets the requirements of this Schedule.

Water in Underground Workings

(10) No owner, agent, or manager shall allow water from an underground exploration area at a designated site to be discharged or to escape into surface waters until

(a) samples of the water from the underground exploration area have been taken and analyzed for radioactivity and dissolved uranium in accordance with Schedule E by a laboratory experienced in analyzing for radioactivity and dissolved uranium, and

(10) (b) the results of the analyses under paragraph 10 (a) show that the water from the underground exploration area does not exceed

(i) the Guidelines for Canadian Drinking Water Quality: 1987 (Health and Welfare Canada), or

(ii) the average background level of radioactivity or dissolved uranium in the water at the site by more than 10% of the water quality standards of the Guidelines for Canadian Drinking Water Quality: 1987 (Health and Welfare Canada).

(c) The owner, agent, or manager of a mine at a designated site shall ensure that copies of the test results referred to in sections 10 (a) and (b) of this Schedule are forwarded to the chief inspector and the district inspector within 14 days of receiving them from the laboratory.

Schedule D

Analytical Standards

Collection of Water Samples

(1) Water samples shall be collected in accordance with the following standards of the American Society for Testing and Materials, as amended from time to time

(a) methods D1066,

(b) method D1192,

(c) method D3370.

Analysis of Water Samples

(2) Where a person analyzes water samples for the following constituents, he shall use the specified methods of the standards of the American Society for Testing and Materials, as amended from time to time, as set out below

(2) (a) High Resolution Gamma-Ray Spectrometry of Water	ASTMD3649
(b) Beta Particle Radioactivity of Water	ASTMD1890
(c) Alpha Particle Radioactivity of Water	ASTMD1943
(d) Uranium in Water	ASTMD2907
(e) Thorium in Water	ASTMD2333

Calibration

(3) (a) Where a person is testing for uranium or thorium or both, pursuant to this code he shall use radiation measuring devices that are calibrated

- (i) before use, on the day so used, and
- (ii) at least once a month using reference materials containing concentrations of uranium or thorium or both that have been certified by the Canada Centre for Mineral and Energy Technology (CANMET), Certified Reference Materials Project.

(b) A person who tests for uranium or thorium or both under this code shall keep records of each calibration of the radiation measuring devices so used.

Determination of Concentration of Uranium or Thorium

(4) Where a person is determining the concentration of uranium or thorium in a geological sample under this code, he shall use

- (a) conventional analytical techniques,
- (b) equipment calibrated and monitored using reference materials containing concentrations of uranium or thorium or both that are certified by the Canada Centre for Minerals and Energy Technology (CANMET), Certified Reference Materials Project, and
- (c) where the level of uranium or thorium in the sample exceeds 0.01% by weight, methods of analyses that are adequate to ensure that no error occurs that is greater than 10% of the concentration of the uranium or thorium or both present in the sample analyzed.

Underground Exploration

Underground Exploration

11.5.1 No underground exploration work shall commence without the approval of the district inspector of mines.

Supervision

11.5.2 No person shall work underground unless they are under the direct supervision of a qualified shiftboss as defined in Part 1 of the code.

Aircraft Operations

Pre-job Planning

11.6.1 Operating procedures, including the selection of aircraft and equipment, shall be planned comprehensively and in detail by qualified persons.

Pre-job Instruction and Training

11.6.2 All persons involved in aircraft operations shall be given adequate pre-job instruction and, when necessary, operational training before actual operations commence.

Job Supervision

11.6.3 All operations shall be conducted under the direction of qualified persons.

Work Prohibition

11.6.4 No person shall be on any load supported or suspended from an aircraft in flight.

11.6.5 Safe access and egress routes shall be available for persons when travelling by fixed-wing aircraft or helicopter

Helicopter Operations

11.6.6 (1) Whenever approaching or leaving a helicopter with blades rotating, all persons shall remain in full view of the pilot and keep in a crouched position. Persons shall avoid the area from the cockpit or cabin rearward unless authorized by the pilot and should not approach from uphill or depart in an uphill direction.

(2) No airlift operation shall be initiated without effective clear channel radio communication between pilots and supervisors of all persons involved in the operation. ***Standard hand signals as shown in figure 11–1*** shall be rehearsed in advance but shall be used only to complete an operation in the event of radio failure when the aircraft has been committed to a point which precludes termination of the operation.

(3) Persons who are in two-way radio contact with pilots, shall be identified by wearing fluorescent red vests or jackets.

(4) In structural erection or dismantling, where existing conditions adversely affect communications between the supervisor and the crew handling an airlifted load, designated crew members shall wear receivers on which they can hear radio communications to and from the pilot.

(5) Appropriate personal protective equipment, including head, hands, hearing, and eye protective gear, shall be worn by workers employed in proximity of operating helicopters.

11.6.7 (1) Persons shall not touch an airlifted load or any part of its rigging until accumulated static electricity has first been discharged to ground.

(2) Material assembly yards, landing areas, and work sites shall be located at a safe distance from trees, poles, power lines, and other obstructions, and shall be kept clear of slipping and tripping hazards, and excavated materials or other obstructions, which could endanger persons during placement of airlifted loads.

(3) In all work areas exposed to rotor downdrafts, equipment and materials shall be secured against dislodgement, and effective measures shall be taken to control dust and prevent loose materials from becoming airborne.

(4) Helicopters shall be equipped with both electrically and mechanically operated load release mechanisms, to permit instant release of the load in an emergency and the automatic load release mechanisms shall not be armed while handling loads over persons.

(5) Tag lines shall be of a length that will not permit their being drawn up into rotors.

(6) Persons shall keep clear of airlifted loads except for those persons directly involved in handling and securing the loads.

Landing Pads

11.6.8 Any structure provided for a helicopter landing pad shall

(1) be constructed so as to ensure stability for the helicopter and provide a safe, non-slip footing for persons, and

(2) (a) where required by the district inspector, have a permissible loading certificate signed by a professional engineer, and

(b) have the permissible load limits marked on the structure in a manner clearly visible to the helicopter pilot or the pilot shall be given a written copy of the permissible loading certificate.

Acid Generating Strata

Acid Generation

11.7.1 Where it is likely that acid strata will be encountered during exploration activities, the manager shall undertake acid generation prediction tests for all strata and deposits.

11.7.2 Where the results of tests in section 11.7.1 show that acid generation can occur, then the requirements of Part 10.6.16 shall be followed.

Precautions — Pits and Trenches

Protection of Workers

11.8.1 No person shall enter any excavation over 4 feet (1.22 m) in depth in unconsolidated or consolidated material which may weather unless

(1) the sides of the excavation are sloped to a safe angle, or

(2) the sides have been supported by a system approved by the district inspector.

Sloping Requirements

11.8.2 (1) Sloping of the sides of excavations may be undertaken instead of shoring only where the protection afforded to personnel is equivalent to that provided by shoring.

(2) Where excavation walls are sloped as a substitute for shoring, the walls shall be sloped at angles, dependent upon soil conditions, which will provide stable faces. In no case shall such a slope be steeper than one horizontal to one vertical.

Shoring

11.8.3 When shoring is installed or removed, the work procedure shall ensure that persons are not exposed to undue risk. In general, shoring shall be installed from the top down, and shall be removed in reverse order.

Removal of Excavated Material

Proximity to Edges

11.9.1 Excavated material shall be kept back a minimum distance of 1 m from the edge of any trench excavation, and 1.5 m from any other excavation.

11.9.2 (1) Where the excavation is in rock and less than 2 m in depth, the sides shall be scaled to prevent loose material falling onto persons working in the excavation. The width of such an excavation shall be such that a person is able to turn around without coming into contact with the sides.

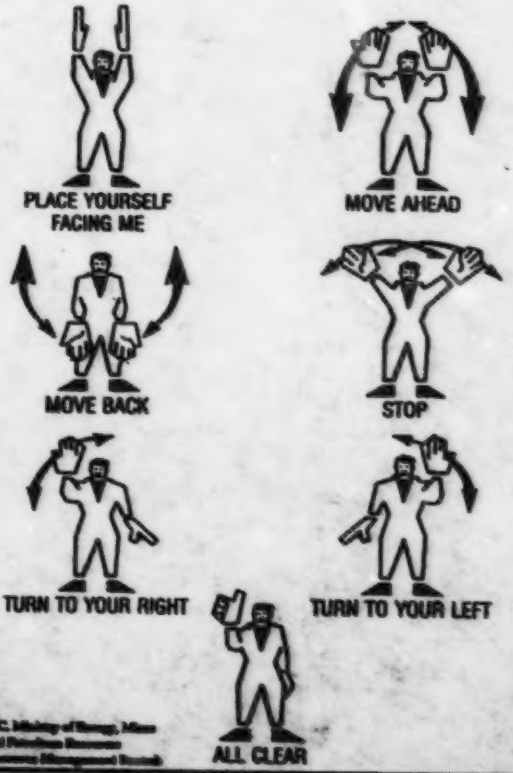
(2) Where the excavation is greater than 2 m in depth, the sides shall be supported in a manner acceptable to the district inspector.

11.9.3 All excavations shall be inspected immediately before any person is allowed to enter. Any hazard shall be made safe before persons are allowed to conduct other work in the excavation.

Figure 11-1

STANDARD SIGNALS FOR CONTROLLING AIRCRAFT MOVEMENT

MARSHALLING SIGNALS

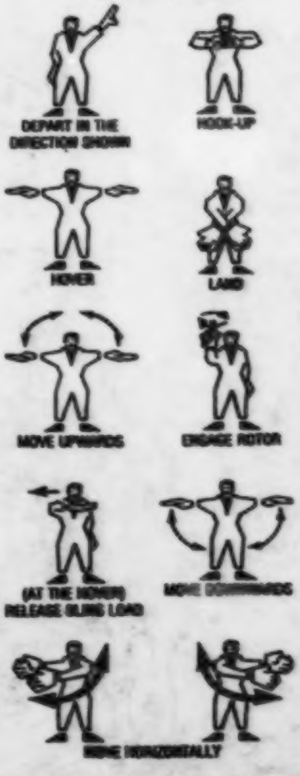

PLACE YOURSELF FACING ME
MOVE AHEAD
MOVE BACK
STOP
TURN TO YOUR RIGHT
TURN TO YOUR LEFT
ALL CLEAR

B.C. Ministry of Energy, Mines
and Petroleum Resources
Resource Management Branch

Figure 11-1 (cont.)

STANDARD SIGNALS FOR CONTROLLING AIRCRAFT MOVEMENT

HELICOPTERS


DEPART IN THE DIRECTION SHOWN
HOOK-UP
HOVER
LAND
MOVE UPWARDS
ENGAGE ROTOR
(AT THE HOVER) RELEASE SLING LOAD
MOVE DOWNWARDS
MOVE HORIZONTALLY

Abandoned or Old Workings SECTION
- *see also* **mine closure**
  - **reclamation and closure**
- and mine workings 6.41.1
- coal and hardrock mineral mines 10.1.2(5)
- definition page 10-3
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MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES

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